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TRANSACTIONS

OF THE

Massachusetts Horticultural Society,

FOR THE YEAR 1892.

PART I.

BOSTON:
PRINTED FOR THE SOCIETY.
1892.

☞ SEE LAST PAGE OF COVER.

TRANSACTIONS

OF THE

Massachusetts Horticultural Society,

FOR THE YEAR 1892.

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BOSTON:
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The following papers and discussions have been circulated to some extent in the form of slips reprinted from the reports made by the Secretary of the Society in the "Boston Transcript." As here presented, the papers are printed in full, and the discussions are not only much fuller than in the weekly reports, but, where it appeared necessary, have been carefully revised by the speakers.

The Committee on Publication and Discussion take this opportunity to repeat what they have before stated, that the Society is not to be held responsible for the certainty of the statements, the correctness of the opinions, or the accuracy of the nomenclature in the papers and discussions now or heretofore published, all of which must rest on the credit or judgment of the respective writers or speakers, the Society undertaking only to present these papers and discussions, or the substance of them, correctly.

O. B. HADWEN,
WILLIAM H. HUNT,
J. D. W. FRENCH,
Committee on Publication and Discussion.

TRANSACTIONS

OF THE

Massachusetts Horticultural Society.

BUSINESS MEETING.

SATURDAY, January 2, 1892.

A duly notified stated meeting of the Society was holden at eleven o'clock, the President, WILLIAM H. SPOONER, in the chair.

This being the commencement of the term of office of the new board of officers and standing Committees, the President delivered his annual address, as follows:

PRESIDENT SPOONER'S ADDRESS.

Ladies and Gentlemen of the Massachusetts Horticultural Society: Standing expectant before the opening portals of another year, let us, as we exchange our friendly greetings, remember with pleasure the gratifying results of our labor in the year which has closed its record — although in our pursuits such records cannot justly be said to have closed, because from season to season they link themselves together as the fruit follows the blossom, and the attainment of any unusual development gives promise of new opportunity for effort and new achievement.

In the review of the year's work, as it appears from the partial reports of our standing committees and from personal observation, it presents a retrospect of phenomenal success; and, while we have felt each year that we had made marked progress, we have even more than the ordinary ground for gratulation at present. Our gain has been especially evident in the merit of the weekly shows, some of which have been almost equal to annual exhibitions of former years.

Our only regret is spent upon the Annual Rose Show, which was far from creditable in some of its features; affected in some

degree by weather, but also from what is, in my judgment, a mistake in the method of conducting it. I have always upheld the idea that no exhibitor should be allowed to compete for the several classes of prizes using the same varieties of flowers, the tendency being to weaken the value of collections. There is a possible temptation, if competition requires but few varieties, to strive for prizes rather than for progress, and, under such a system, our array of roses would present few novelties and almost monotonous repetition. Our pride in the general standard should outweigh all consideration of personal advantage.

We are much indebted to our Committee on Discussion for work which was most faithfully performed, and which was far from easy, the selection of subjects for papers, and competent persons to prepare them, requiring discrimination and study — a work which, for the greater part, was a labor of love, and the results of which were exceedingly creditable. The method which was adopted of notifying the public from week to week of subjects in advance had the effect of filling our Library Room, so that we were obliged to avail ourselves of the larger accommodation of the Lower Hall. Meetings of this character, treating of practical subjects, are interesting and instructive to all classes of cultivators.

Several weeks ago the name of Hon. E. W. Bull, of Concord, Mass., was proposed here for honorary membership, and the Executive Committee will recommend the name today. One of our members, at a meeting last winter, said he "would like to see in Horticultural Hall monumental tablets to commemorate the services, and to honor the names of noble discoverers or producers of good things, such as E. W. Bull, the originator of the Concord grape."

It seems to me that our associate struck the right chord. Mr. Bull's case is an exceptional one; he never has realized pecuniarily what his wonderful product deserved. Do we appreciate what an achievement this was of Mr. Bull's, and what an immense horticultural industry, with large revenue, it has been instrumental in developing? Would it not be desirable for the Society to give honorable record in some lasting form to their high consideration of Mr. Bull or of any other successful originator of horticultural produc

Perhaps because it has become so common for our people to travel in other climes where fruit can be used at all seasons, and

also because so many vendors of fruit have migrated to our own shores, that the taste has become grafted into our plain New England fare, and fruit is used in quantities now which would have amazed us fifteen or twenty years ago, the gain given to its culture by such eminent producers being thus brought daily before every lover of these luscious delicacies.

In spite of former traditions of our rock-bound coast and shores that were always poetically called "rugged," we are surprised to find Cape Cod and the Buzzard's Bay section of the South Shore unfolding wonderful results in gardening, Mr. Fay on the one side, and Mr. Simpkins on the other, having shown the capabilities of the two extremes, and proved their ability to produce early vegetables and flowers quite in advance of growers in this vicinity. A field seems opening in this direction for enterprising young horticulturists, who are willing to exert themselves in bringing forward the possibilities lying nearer our home market than the distant lands of the South or West.

The report of the Committee of Arrangements is worthy of careful consideration, as we shall learn from it what the several exhibitions at which an admittance fee has been charged, have actually brought into the treasury of the Society. This report shows:

Receipts	$3,520.62
Expenses for labor, advertising, etc. . . .	1,462.83
Leaving a balance of	$2,057.79

This is exclusive of any recognition of the rent of the halls. If this were added it would more than exhaust the surplus, amounting as it would to $2,133.33, and thus leaving a deficit of $75.74. If we add to this the sum appropriated for prizes at the five exhibitions ($4,165), it can justly be claimed that this Association is a generous public educator. The exact statement of each exhibition is as follows:

Receipts of		Expenses.	Profit.
Spring Show	$930.12	$320.34	$609.78
Rose and Strawberry Show .	276.25	169.60	106 65
Plant and Flower Show . .	498.25	244.29	253.96
Fruit and Vegetable Show .	138.25	217.73	*79.48
Chrysanthemum Show . .	1,677.75	510.87	1,166.88

* Loss.

I make these statements to suggest the possibility of some changes being desirable, which should combine a fair respect to the pecuniary interest of the Society with the wisdom of adjusting the prominent shows to the seasons when they would be best appreciated.

The Committee on Prizes propose in the coming year to make the Rhododendron Exhibition in June one for which an admittance fee will be charged, and as the Rose and Strawberry Show occurs during that month it might be made free to the public, especially as the conditions of the season may compel exhibitions at different dates.

In September so many persons remain at the sea-shore or among the mountains that our Plant and Flower Exhibition receives far less patronage than the outlay of time and money merits, and it might wisely be made a free exhibition of less magnitude. The Spring Exhibition and the Rhododendron and Chrysanthemum Shows could then, perhaps, be enlarged by offering additional prizes for plants.

We know how much the success of our exhibitions depends upon the Committee of Arrangements, and how large a share of its labors devolves upon its Chairman. I am sure we all sincerely regret to lose the valuable services of Mr. Norton, who has filled the position with marked ability for two years. We realize that the duties are onerous, and perhaps the proposed changes might lighten the load in some degree, so that Mr. Norton can be induced to retain the office.

I desire also to bear witness to the faithful service of our Secretary, his assistants, and the Treasurer, all of whose work has been well done; in fact, all the officers of the Society have worked together with unanimity and zeal.

The new plan of dividing the Plant and Flower Committee has been tried during the past year, and the distinct Committees work very successfully. The new By-Laws have also been in force for the past six months.

The attendance at our quarterly meetings has been greatly increased by notification to members, but the adjourned meetings have been too much neglected; they are frequently as important as the quarterly meetings, and deserve attendance to prevent unnecessary delay in business.

The TRANSACTIONS will hereafter be mailed to members, and

should any errors occur in the addresses the Secretary should be notified. Those for the first part of the year 1891 have been distributed, and form a publication reflecting credit upon their careful editor, our Secretary. The contents are well worthy of preservation for reference.

It will be noticed by the Schedule for 1892 that an addition of $750 has been made to the premium list. If the financial condition of our Society permits, it would seem a wise policy to add to this list as circumstances demand.

We need to be constantly reminded of the importance of increasing our young, active membership, upon which the perpetuation of our institution so largely depends. In an examination of the records we find that Mr. Leverett M. Chase, who joined the Society in 1887, has since that time introduced for membership thirty-five names. Should not this example stimulate us to similar effort and incite us to share with others the legacy which the founders of this institution have left us?

Last January the drains of the building were thoroughly repaired, and are now in excellent condition. There is an immediate need of repairs upon and additions to the furniture of our halls, such as would naturally be required in a building so constantly in use.

The project of establishing a national arboretum at Washington is attracting a considerable degree of public attention, and in that equable climate fine results may be anticipated. It would educate tree lovers wonderfully, and its advantages are too obvious to require urging; this Society might appropriately lend its influence.

I referred last year to the World's Columbian Exposition to be held in Chicago in 1893. What measures this Society will take, if any, is for you to determine, but whatever is done should be done as early as possible, at least as far as the initiatory steps.

There have been several deaths among our members during the year. John B. Russell died in Indianapolis. He was the last survivor of the founders and corporators of the Society, and one of the most active of its early members. Resolutions of respect to his memory have been presented. Dr. George B. Loring, of Salem, who, though not an active member of the Society, was largely identified with the agricultural interests of the State and nation, will be greatly missed in this department. P. M. Augur, of Middlefield, Ct., State Pomologist of Connecticut, a successful

cultivator of small fruits, especially the strawberry, and originator of several seedlings of value, is dead. We remember with gratification the admirable paper which he read here last winter. Allen V. Abbott, of Boston, for some years janitor of our building, and who filled that position with great acceptance to members, is gone. We have also lost Alexander Anderson, William C. Child, T. O. H. P. Burnham, Eben Snow, Edward Burley, Horace Richardson, and John O. Sargent.

Since writing the above, the sudden death of E. F. Bowditch, of Framingham, has added another to our list of highly esteemed members who have passed away. In the prime of life and full activity, his genial nature made him a pleasant addition to any association, and his loss will be deeply felt. His interest in agriculture, and his intelligent understanding of all its branches, formed a marked feature of his active life, and made him a valuable member of the State Board.

It is my privilege again to report the finances of the Society as in a prosperous condition. At the beginning of the year there was remaining unpaid $15,000 of the mortgage debt. Since then $14,000 has been paid, leaving a balance of $1,000 which was assumed by our best of friends, the Chairman of the Committee on Finance, who will hold it subject to the convenience of the Society to pay. This was deemed best on account of certain conditions in the Stickney Fund.

I would suggest as a precautionary measure that the Society by vote provide that any individual, firm, or association which desires to offer special prizes through this Society, shall, when such a request is presented, accompany it with the amount in money or its equivalent. It would also save a very considerable expense to the Society if such requests could be made before the Prize Schedule is printed in December.

The Treasurer's Report is not quite complete. It will show gross receipts for the year of about $57,315.39, including a balance on hand January 1, 1891, of $15,222.08. The total expenditures have been $41,296.32, leaving a balance of cash on hand December 31, 1891, of $16,019.07. The receipts from Mount Auburn Cemetery for 1891 are $5,312.32, included in the above amount.

The address was received with tokens of approval, and on motion of C. M. Atkinson it was voted that it be printed and a copy sent to every member of the Society.

Mrs. H. L. T. Wolcott, Chairman of the Committee on Window Gardening, read the Annual Report of that Committee, which was accepted and referred to the Committee on Publication.

The appropriation of $7,550 for prizes, recommended by the Executive Committee at the November meeting, came up for final action, and was unanimously voted.

The President, as Chairman of the Executive Committee, reported, recommending the following appropriations, which were unanimously voted:

For the Committee on Window Gardening, this sum to cover all incidental expenses of the Committee, and to be paid through the regular channels . . .	$250
For the Library Committee for the purchase of magazines and newspapers, binding of books, and incidental expenses of the Committee	300
For the same Committee, to continue the Card Catalogue of Plates	100
For the Committee of Arrangements, this sum to cover all extraordinary expenses of the Committee . .	300
For the Committee on Publication and Discussion, including the income of the John Lewis Russell fund .	300
For the salaries of the Treasurer and Superintendent of the Building, and the Secretary and Librarian and his assistant	3,300

The Secretary read two communications from J. M. Samuels, Chief of the Department of Horticulture of the World's Columbian Exposition, in regard to collective exhibits in that department accompanied with a blank application for space, and, on motion, the Chair appointed O. B. Hadwen, B. G. Smith, and L. M. Chase a Committee to take the subject into consideration.

The following-named persons, having been recommended by the Executive Committee, were on ballot duly elected members of the Society:

Hon. THOMAS W. BICKNELL, of Dorchester,
Hon. A. SHUMAN, of Roxbury,
THOMAS A. COX, of Dorchester,
MAURICE P. WHITE, of Roxbury.

On recommendation of the Executive Committee, Hon. EPHRAIM W. BULL, of Concord, was elected an Honorary Member of the Society, and EDGAR SANDERS, of Chicago, a Corresponding Member.

O. B. Hadwen, Chairman of the Committee on Publication and Discussion, announced that the series of Meetings for the Discussion of Horticultural Subjects would be opened at 11 o'clock on Saturday next, by Hon. John E. Russell, who would speak on the "System of Irrigation in the Nile Valley," and that, as usual, these meetings would be open to all, and that all were freely and cordially invited to attend.

Adjourned to Saturday, January 9.

BUSINESS MEETING.

SATURDAY, January 9, 1892.

An adjourned meeting of the Society was holden at 11 o'clock, the President, WILLIAM H. SPOONER, in the chair.

Francis H. Appleton, from the Committee on Large or Interesting Trees, stated that the Committee had prepared a list of such trees in New England, and moved that they be authorized to print it at an expense not exceeding ten dollars. The motion was carried.

On motion of Benjamin G. Smith it was voted that, in compliance with the rules of the State Board of Agriculture, three prizes of $10, $8, and $6 be given for the best reports by awarding committees, and that the Committee on Publication and Discussion be requested to award these prizes.

It was also voted that, to facilitate making the returns required by the State Board of Agriculture, the awarding committees record the residences of all persons to whom awards are made.

The President, as Chairman of the Executive Committee, reported the appointment of Charles E. Richardson as Treasurer and Superintendent of the Building, and Robert Manning as Secretary and Librarian for the year 1892.

Adjourned to Saturday, January 16.

MEETING FOR DISCUSSION.

Soil and Irrigation of Egypt.

By Hon. John E. Russell, Ex-Secretary of the State Board of Agriculture, Leicester.

The fixed population of Egypt live in the very bed of the Nile. Much of the soil they till is submerged at the inundation, though a much smaller part than is generally supposed, but all of it is watered by irrigation. There is a wandering population of 200,000 or 300,000 Bedouin, who roam at will in the desert, pasturing flocks at the numerous oases, and maintaining a wild independence.

The desert is always in sight, even from cultivated fields, sometimes approaching the green strip of land bordering the river in undulating gravelly sands; again in grit-stone mountains that look weather-worn and shaly and seem to be crumbling into the all-devouring sands.

Looking toward the desert and the rocks, the scene is one of utter desolation. There is no sign of vegetable life — no seed ever germinates in the sterility of that absolute, eternal drought. As you pass into the desert you find it quite different from your expectations; instead of shifting sands sinking under the feet, you walk upon a hard floor on which is scattered broken stone, as if strewn from the mountain ridges; there are abundant nodules, pebbles of silex, and pieces of flint.

In the lower and middle Nile valley the color of the desert is gray or yellow. Above the first cataract you reach the syenite rocks, and the desert becomes reddish-brown and scattered with stones of the same color.

The wind blows sweet and dry over these soils or sands; there are no disease germs in the free air; malaria has no place in this purity; your lungs expand, your blood quickens in its flow; you walk with elastic step; you run without fatigue; your appetite is equal to coarse food, and you feel sympathy with the love of the Bedouin

for his wide, breezy, open waste of desert; you know why he loves its freedom and rejoices in its firm, smooth, gravelly track. When the fit seizes him he can spur his horse and gallop over it where he listeth; he can see his enemies like spots on the far horizon; there is no hiding-place, no ambuscade, and whoever breathes its dry, bracing air, or sees the blaze of stars over it, will share the feeling of the Arab.

In the winter the prevailing winds are from the north and the north-west. The temperature at about eight o'clock in the morning is rarely above 55°. At mid-day it is from 60° to 70°. Later in the season the wind gets into the south and becomes what is dreaded under the name of a "Khamsin;" this sometimes blows for several days — a sultry, sickening wind, raising storms of sand that blow in dark clouds, penetrating every crack and creating discomfort — even suffering, which words fail to describe. One readily sees, in the effect of one of these storms, how the fertile land may be ruined by the drift, and how temples and tombs have been covered for ages until dug out by the zealous archæologist.

Coming back to the life of the river, the fertile land is sometimes not over ten feet in width, and even this is cut off in places by the desert mountains, through which the waters have worn their channel; but the average width of the middle and upper Nile valley, assisted by canals and irrigating machines, may be two or three miles. Over part of this the inundation takes effect.

Much water is retained in canals, which are extensive and important works of the Khedives, and is raised by machinery used for constant irrigation. Large sugar estates, of which there are many, and gardens of rich proprietors, are watered by steam-engines that pump into irrigating channels.

One of the common methods, the "shadoof," has been in use since the days of the Pharaohs, or from before the beginning of history. The other, the "sakia," is not an Egyptian invention. It is Persian, and does not appear in the ancient tomb pictures. It is a simple machine. A well, usually made permanent with stone casing, is in the bank of the river or canal; in this a wheel, from six to ten feet in diameter, is hung, over which passes an endless chain of water-jars which descend, mouth downward, when the wheel is turned, and come up filled with water, which is emptied into a trough as they pass over the centre.

On the axle of the great wheel is a smaller one with cogs

This is geared with a lateral wheel, which is fixed upon an upright post, turned by oxen. This machine is never oiled, is ill made, and badly fitted. It makes a wailing, groaning, or shrieking cry, that can be heard a long distance. When several of them are grouped the noise is hideous. They are not unfrequently worked all night, and then, if your boat is near them, sleep is impossible.

The ancient Egyptian machine for raising water, most commonly used, is called the "shadoof." This primeval contrivance was familiar to Joseph, Moses, and Abraham, or may go back ten or twenty thousand years before them. It consists of two upright posts, usually palm-tree stumps, or pillars of dry clay, about thirty inches apart; a cross-bar supports a pole ten or twelve feet in length, the shore end of which is weighted with a lump of clay; from the other end, over the river bank, hangs a pole to which is attached a leathern bucket, or a woven basket lined with skin or cloth.

The man pulls down this sweep, fills his bucket, and the lump of clay on the other end helps him to raise it swiftly; he then empties it into a channel which conveys it to the field.

If the bank is high, three or four of them may work one above the other, the lower ones raising the water from receptacle to receptacle. This is most laborious. In the warm weather the workers are quite naked, showing figures beautifully developed, and they chant a wailing song in a minor key, always the same; like the song of birds it knows no change; it was heard in ages long ago before history began. It may have reached the sad heart of the captive Hebrew, when, sick for home, he stood in tears amid the alien corn.

The people are not a meagre and ill-nourished race. The young women are handsome, and have stately figures, with dignity of movement, acquired from carrying heavy water jars upon their heads. They dress in long cotton frocks, and the men wear a similar garment, but it is often taken off, revealing straight, muscular, springing figures, that are studies of manly beauty. The games of Greece showed whiter and rosier forms, but the difference between them and the Egyptians was only in color.

Here the bronze Narcissus waters the field, unconscious of his beauty. Antinoüs leads his camels without shame of his con-

dition, and Mercury with slender heels, unwinged but light, chases the stray asses or drives the wandering sheep from the clover.

The severe labor of Egypt from the beginning until now has been in irrigation; the Nile is the source of all life, and its inundation is as necessary to vegetation as is the heat of the sun. This annual overflow is due to the prodigious rains which in their regular season fall in the Equatorial region.

The river begins to swell about June 25th, and continues with gradual increase for three months, when it reaches its limit. It remains at flood twelve days, and then subsides with the same gradual and gentle action. At Thebes and Luxor the rise is thirty-six feet, flooding the temples of Karnak, and covering the plain leading to the Ramesium, rising to the knees of the vocal Memnon. In ancient days these works must have been protected by dikes.

Though a great part of the life of ancient Egypt is detailed with wonderful clearness on the walls of tombs, we have no description of irrigation other than the rude machine now in common use, which I have described. We know that there were dikes, canals, and artificial lakes, and that great areas of land were thus made available; it is certain that the engineering which moved the enormous obelisks from the quarries above the first cataract to any part of the country desired, was also exercised in controlling and utilizing the source of Egyptian life, but the physical changes of thousands of years have left no remains of its work in that direction.

At the time of the greatest power of Egypt — in the eighteenth and nineteenth dynasties, from three thousand five hundred to four thousand years ago, when their dominion extended to the Soudan and over western Asia, and the most splendid temples and colossi were raised — the source of their prosperity and power was in their skill to control the flood of the Nile, and lead its vivifying waters through the desert places.

Many centuries later the Greeks, learning civilization, manners, and art from the decaying Egyptians, waged their unending strife against the sandy waves of the Libyan desert, and one of their mythological fables describes it. It is the story of the battle between Hercules and Antæus, Son of the Earth. The struggle was long, for whenever the mortal was felled to the ground by

the vigorous god, his force was renewed by contact with the breast of his mother, and, springing to his feet, he recommenced the never-ending strife.

The Nile flows for fifteen hundred miles without an affluent and without rain, wasted by a tropical sun, by the absorption of the thirsty desert, and by the irrigation required for eight thousand five hundred square miles of cultivated land. This continuous waste has the effect, peculiar to this river, that it grows larger as it is ascended, until between the rocky walls of its Nubian bed it pours a torrent in volume far greater than that which passes Cairo and joins the waters of the Mediterranean.

The greater part of its course through upper and lower Egypt is in a bed cut in its own alluvium, and the effect of this has caused the banks to be higher than the ground back of them, so that there is a transverse slope from them back to the desert; this is raised higher by dikes, which prevent overflow except when water is intended to pass.

It has always been stated by travellers and is one of the fictions of the guide-books, that the prodigious fertility of Egypt, continuing from prehistoric ages up to the present time, is due to the fertilizing deposit of silt brought down from the plains of Abyssinia; this has its effect, not to be under-rated, but it is not a sufficient cause, as may be judged by the analysis of the water.

It contains traces of lime, magnesia, soda, potash, chlorine, sulphuric acid, but less than is found in the Seine or in the Thames at Hampton. It contains about the same material in solution that is found in the rivers of Europe, — the Rhone, Garonne, or Rhine; but the Danube carries double and the Mississippi six times the sediment that is found in the Nile. One hundred parts of the deposit is found to contain:

Organic matter	15.02
Phosphoric acid	1.78
Lime	2.06
Magnesia	1.12
Potash	1.82
Soda	.91
Aluminum	20.92
Silica	55.09
Carbonic acid	1.28

Thus it will be noticed that sand and clay make seventy-six parts in one hundred.

It is not a material that a Yankee farmer could afford to draw from a distant swamp. But the Nile deposits are not the only source of the Nile's recuperative power of soil which supported the population of the valley twenty-thousand years ago, and that stored corn from which other people came to buy, in earliest history, and that made Egypt one of the granaries of imperial Rome. There is a subsoil below the alluvial deposit, whose active properties, when brought to the surface by infiltration or by irrigation from wells, are powerfully effective. Water taken from wells at a distance from the river, and which has come from the river by infiltration, differs greatly from the water of the river in chemical elements, and contains much more soluble matter. I regret that I cannot give you an analysis, but I know that there are four times as much lime and magnesia, ten times as much chlorine, and double the sulphuric acid.

Such land, near the desert, if thoroughly infiltrated, and the water allowed to evaporate, shows deposits of white salt on the surface, and becomes sterile like the valley of the Dead Sea. This land, if the water is drained by canals, or if protected by dikes and irrigated from wells, is enormously productive.

I have said that we do not know how the ancient Egyptians irrigated the land. We know that it supported a population more dense than in any other part of the world.

We do not know how the work was done in the time of the Ptolemies, or under Roman rule. The waste, sloth, and ruin that came over the country under Mussulman dominion reduced the people to utter misery and first principles. The work of irrigation was done by the river and the rude machines upon its banks; but in the present century Mahomet Ali revived the productiveness of the soil by digging a system of canals which drained the plains and supplied water during the dry season for interior irrigation. This permits continuous cultivation through the year, except in basins which are filled during the inundation, and are only used for an annual crop.

It will seem strange to my hearers to be told that until the occupation of Egypt by the English all the public works were carried on by forced labor, thousands of the Fellaheen being conscripted, taken to the canals, often at a distance from their

villages, and driven by the lash. Many of them died from overwork and miserable food. Those who lived, when released, had to find their way back to their homes as best they could. Indeed, under the old Turkish and Khedival governments, the lot of the peasants was worse than slavery, for they were sacrificed without remorse or care on the part of their rulers.

All this injustice has ceased under the British rule. Public works are carried on with system, carefully planned by competent engineers, and the work is awarded to contractors, who have no control over labor except to see that they get a day's work for a day's pay. The old canals are kept clean and efficient; many new ones have been excavated, and a great quantity of land that had been idle for lack of irrigation has been restored to agriculture.

The population of Egypt to the square mile is more dense than that of any part of Europe, and entirely dependent upon agriculture, as a country without mines, forests, or commerce must be. The richest crops — those that can be turned into money to pay taxes, which are very heavy, and to pay for imports — are sugar, cotton, cotton seed, and wheat.

The sugar industry, though still large, has declined because of the enormous supplies stimulated by the bounty systems of France and Germany, but the increase of cotton planting is rapid and is greatly encouraged by the English; the supplies of wheat for export are small, according to our ideas.

The whole revenue of the country is about $47,000,000. Of this, $27,000,000 is derived from a land tax, and some $6,000,000 from other direct taxes. There is a monopoly of tobacco in the government; the remainder is from customs duties. There is a strong effort being made by the English administration to enforce economy and to refund the public debt at lower rates of interest, and I think there is a great deal of hope for the future of Egypt.

In some prefatory remarks, Mr. Russell said that while his subject was not one of importance to the agriculture of Massachusetts, it was a matter of curious interest from an agricultural point of view, particularly as a proof of the value of water in agricultural operations on the one hand, and the necessity of drainage on the other.

In the course, or at the close of the lecture, the following additional facts and observations were given:

The conditions of the Nile valley are different from those exist-

ing in any other part of the world. The delta formerly included several mouths, but there are now only two. From the delta, going up the stream from six to seven hundred miles, the valley of the Nile averages not more than two miles in width, and in some places is not above from ten to fifteen feet wide. Yet from six to seven millions of people subsist on the products of that area. They use the river as a highway at all times, and what with the creaking of the sakia, or Persian water-raising machines, and the swearing, shouting, and shrieking of the boatmen and many of their passengers, for which the Arabic language seems peculiarly adapted, the air is filled with an almost intolerable confusion of discordant sounds. People may get used to it, perhaps, as they do to electric cars, etc.

Speaking of the annual flooding of the lower Nile, the lecturer stated that the spring rains were so continuous and abundant as to fill the higher country in Equatorial Africa; but that the area so flooded was so great as to account for the gradual rise and fall of the Nile through Egypt. He believed also that the oases of the desert of Sahara are sustained by subterranean streams from this high country. While the regular inundation of a large portion of the valley of the lower Nile, and the consequent possible irrigation of some other parts by means of large preserves of this water in artificial lakes, are deemed of essential importance to the productiveness of Nile lands, there are large areas on which draining is a prime necessity, for the reason that either flooding or irrigation would render them absolutely sterile.

The death of the Khedive brings up the question of the future control of Egypt. The speaker went to Egypt with the usual prejudice against British occupation; but from what he saw and learned otherwise of the condition of the people under the sway of Turkish and Khedival governments, as compared with that under British rule, he was convinced that the salvation of the country and people depends on the permanence of British control. Since the present system became established, there has been great improvement in all departments of both public affairs and private interests. While taxes are enormously heavy, they are levied upon a just system; they are laid principally on land. Under the old method, the tax-gatherer called upon the tax-payer for such amount of money as he wanted, and if it was not forthcoming, the delinquent was sometimes whipped on his feet.

Under the English system, the collector demands the tax, which is levied upon all, on one basis. If the man is sick, or has lost his camel, or from any cause cannot pay, his land may be sold for the tax. He may drift downward into the "Fellaheen" caste; but understanding that all his neighbors are taxed *pro rata* with himself, he quietly receives the blow of adversity as from a "stick given from heaven." In his remarks upon the public debt of Egypt, Mr. Russell stated that it would have been refunded long ago but for French influence.

The productions include almost everything planted that the length of the season is sufficient to mature. No winged or other seeds can find lodgement in the desert, and in the Nile valley the inundation would destroy most trees. Date-palms are everywhere in sight. These and other fruiting palms are taxed. A small grove of fruit-palms is a means of support as well as comfort to its owner. The doom-palm or sycamore-fig (*Hyphæne thebaica*), mulberry trees, weeping-willow, tamarisk, cypress, and acacia are the chief trees. Of the fruits, they have the apricot, peach, sycamore-fig, grapes, both white and black, which have been cultivated ever since the time of Pharaoh, oranges, lemons, figs, bananas, and melons of various kinds. Of vegetables, they grow beans, peas, lentils, vetches, spinach, parsley, leeks, onions, garlic, cabbages, lettuce, cress, and cucumbers: also red peppers, tomatoes, radishes, carrots, turnips, etc. They also raise sorghum, wheat, maize, rice, millet, magnificent clover, hemp, flax, and cotton. Among the flowers, there were the rose, oleander, jasmine, convolvulus, chrysanthemum, dahlia, geranium, violet, and varieties of lilies and poppies. Hashish, or Indian hemp, is grown to a considerable extent, and is smoked to a degree that causes very great injury. While intoxicating liquors are used but very little by these people, the Mussulmans are not short of sins of almost any kind that average people wish to commit. As an illustration of the force that bad habits exert in a public way, the lecturer said the river-boat had to stop at one landing to procure a supply of hashish from a point several miles away. Such is the power a prevailing vice can wield, even against public convenience.

Discussion.

In reply to a question as to rotations of crops, Mr. Russell said that he was not in Egypt long enough to see for him-

self what the practice was, but he learned that wheat is followed by clover, which is largely pastured. The animals are tethered separately, with a very short range; sheep eat the clover down clean, and then they are moved by children to a fresh range. The clover soon renews itself, the manure left by the animals tending to reinforce the land, especially where the land is subject to the inundation, or to irrigation by artificial means. Such land will sustain cropping for an indefinite length of time. He had a talk with one man, who had four or five acres in wheat or clover. In February his wheat was just coming into milk, and at the same time clover was in bloom. The cattle on the place resembled the Jersey breed. The farmer used a crooked root of the tamarisk tree for a plough, yet with such appliances he gathered two crops annually, while we, with the best American ploughs and other tools of equal excellence, can harvest but one crop each year. He asked a farmer how much wheat he would harvest on a piece of land containing something less than two acres, and he replied eighty bushels. The speaker had to answer the Egyptian that in his own country the yield would not be over forty bushels. He felt that he must have shown his surprise, as the man remarked, "God is great, and many things are not revealed." Sorghum is grown mainly for its seed, which is largely fed to animals; the stalks are used for fodder and fuel. No attempt is made to produce sugar from them. The stalks are also used to make the walls of houses, the interstices being filled with clay mud. This is entirely practicable, since rain seldom falls there. At Thebes it is said, "It rains but once in four years." The lecturer thought the schemes proposed here to cause a rainfall would utterly fail in Egypt, where an absolutely clear sky prevails continuously for long periods of time, not a cloud being visible. There is a bright glow or flame about the sun at sunset. The papyrus has entirely disappeared. The lotus also is very rarely seen; the flowers are of three colors. In the gardens at Cairo, roses are cultivated, just as they are at Concord, or anywhere in this State. These roses are of the Persian stock, and were brought from that country with the peach and other plants indigenous in Persia. Roses are sold to travellers and others by children, who frequently offer very poor flowers to their customers.

Leverett M. Chase asked whether artesian wells were in use, or were desirable in Egypt. He also enquired about the dikes and

arched dikes built by French engineers to keep the waters in reserve so as to insure two inundations in a year; and cited a statement that they were from four feet to forty-two feet high. He desired also to learn the range of wages in Egypt.

Mr. Russell replied that, so far as he knew, there are no artesian wells below the first cataract; and that with the inundation and artificial water-preserves such wells are apparently unnecessary. Furthermore, as far into the desert as men wish to go, ordinary wells can be dug easily, the shadoof or sakia be established, and ditches or dikes provided. Wages are very low, the average rate paid in irrigation being but eight cents per day, and the workmen board themselves. The laborers are worked in relays or watches. With English occupation wages in Egypt are improving, and are paid in silver, but they are still very low as compared with those of other countries.

Mr. Chase inquired whether dikes were in use at the delta.

Mr. Russell replied that dikes are of infinite value to the delta lands. The engineering works there are very extensive and the returns satisfactory. The same may be said of the upper Nile, where the water has to be raised above the high banks of the river. This feature of that region is of great interest to travellers.

Mr. Chase said that in our own country we have similar conditions, as in our great Desert of Death, where nothing now exists but some prickly pears and a few lizards. He had faith to believe that that great waste may yet be found susceptible of cultivation under correct, scientific treatment, and may prove to be our best land, capable of sustaining a teeming population.

Henry L. Clapp spoke of the effect of saline matter on the soil of Nova Scotia, where certain lands have been cultivated at least two hundred and fifty years, yet maintain a high condition of fertility.

Mr. Russell said he had observed such lands largely in our own country; also in the valley of the Dead Sea and the valley of the river Jordan, near the Dead Sea. If not irrigated and thoroughly drained, vegetation dies out. He has always understood that such lands were capable of very great fertility, much the same as the valley of the Nile.

Mr. Clapp believed there is something valuable as a fertilizer in salt, which has not yet been discovered. Land which

was covered with kelp and other sea-weeds, to a considerable depth, on farms within three miles of the sea-shore, in Scituate, Cohasset, and Marshfield, produced excellent crops of corn and grass, thirty or more years ago, when he was a boy, living upon a farm in Scituate. The continuance of a high degree of fertility in the lands that once were under the sea in Holland, Egypt, Nova Scotia, California, and elsewhere, cannot be considered a mere coincidence. There must be a reason for it which is not yet recognized and appreciated.

Mr. Russell remarked that there is something in water which we cannot yet understand. Water taken from wells back from the banks of the Nile contains much more fertilizing matter than does the river water. There must be something of value as a fertilizer in this saline matter.

Col. Henry W. Wilson said that the topic as connected with the subject of irrigation interested him very much, as he had given a good deal of thought and labor in that direction. We naturally think of the Nile valley as the great type of irrigation of the whole world, whereas the fact is that there are other nations with as great or greater areas of irrigable lands and methods of irrigation that are far better. The whole area of the lands in the valley of the Nile in Egypt, whether under cultivation or not, amounts to about 4,500 square miles, or 2,880,000 acres, while no one can give an estimate of the area actually under cultivation by irrigation. In Spain the amount of land under irrigation is 2,840,000 acres; in Italy 1,600,000 acres. In Utah the area of lands capable of being irrigated amounts to about 1,500,000 acres, not far from one-third of which is now under cultivation. In California, twelve years ago, about 300,000 acres were under irrigation, and the development of this kind of husbandry since that time has been prodigious. In India the works of this nature have been carried to their greatest perfection. It is not easy to give the total area of irrigated lands, but one canal was 900 miles long, 170 feet wide, and 10 feet deep, and irrigated 1,500,000 acres in 1868. Irrigating canals spread over the whole country, and the aggregate area irrigated by fifteen of the principal canals — one of which irrigated an area equal to or larger than one-half of the Nile valley — amounted to 4,500,000 acres. The banks of all sediment-bearing rivers are considerably higher than the country on either side; this arises from the deposits of sediment, which in times of

overflow are intercepted by the brush and bushes immediately upon the banks, each flood adding its contribution to the elevation of the banks, until the river actually runs on the highest ground and the land slopes gradually away from the river out into the country on either side, so that in the times of the rise of the river, which with the Nile is not in the season of storms but in the beautiful growing weather, the dikes along the river banks simply restrain the waters from inundating the whole country and devastating all of the crops, while a sufficient quantity of water can be allowed to pass through properly prepared gates or openings into the irrigating ditches and be by them distributed over the land, which is all lower than the river banks. When the rise of the Nile does not reach above the normal height of the banks, the water must be elevated into the irrigating ditches, the almost universal contrivance for this purpose being the "shadoof," which is identical with the familiar well-sweep of our New England farms, and was evidently the first device invented by man for elevating water.

However and whatever scholars and theorists may maintain with regard to the benefit of silt in irrigating waters, the husbandman finds that if the water furnished him from the irrigating canal contains silt or sediment, he must extract it before he uses the water on the growing crop. Nothing is of value for the nutriment of the growing crop that is not in solution in the water applied to it, and the irrigator finds that although he has been told of the fertility which sediment-bearing waters will give to his land, yet it is the crop and not the land that he is stimulating this year; he finds that the muds which settle upon the land cover the surface with a coating impermeable to the atmosphere, which is as essential to the growth of the plant as water, and he is obliged to extract these muds from the water before he uses it, by means of settling basins through which the water is passed from the canal. If silt-bearing waters are used upon forage plants, they become coated with the mud which adheres tenaciously and ruins the crop, for no animal will eat forage that is covered to any extent with these deposits. To give an idea of the amount of these sediments it is only necessary to state that in one system of the East India canals, irrigating less than 100,000 acres in 1872, 2,300,000 cubic yards of silt were extracted from them during that year.

Where water is abundant the people become careless and defeat their own purpose by using it too profusely, and, unless ample arrangements are made for the drainage of the land, the crops are injured and the land made swampy to the sacrifice of health as well as the crop. In almost all irrigating countries, malaria follows the introduction of the system.

The temperature of the irrigating water is an important consideration; one can easily understand that water of the temperature of 40° to 45° from deep wells must prove a very sudden check upon a growing plant in the heat of summer, while surface water at 80° would have a very stimulating effect.

The rapid decay of vegetation, which is increased by the too profuse application of moisture, either by storms or by irrigation, may be and is deleterious to health, but hardly so to the growth of any useful plant. The gases evolved must be mainly carbonic, and if we are to credit geologists, the atmosphere of the carboniferous era was highly charged with carbonic acid gas.

Some of the most remarkable illustrations of the utility of irrigation as an accessory of husbandry are to be found in the Humboldt Valley in Nevada. This is the country of the sage-brush, a plant that resembles in size and appearance the large bushes of box that adorn old gardens; for more than eight hundred miles the country west of the Rocky mountains and east of the Sierra Nevadas seems to be covered with this shrub; its only use is to afford cattle an apology for forage in the winter; they will not touch it at any other time. The surface of the soil is the picture of barren desolation — as brown and sterile as the walks upon the common or public squares. Yet when it is cleaned of the sage, ploughed, and seeded down, the waters of the Humboldt river are applied to it with the most surprising results. Alfalfa is the favorite forage crop in that country, and grows in three months' time, when it is cut and cured. Irrigation is then applied, which is all that is requisite for another crop, as a "stand" of alfalfa is good for twenty-five years. In this way four crops of from four to five tons per acre of dry hay have been taken from the land in a year, selling readily at from eighteen to twenty dollars per ton. Substantially all of the summer flow of the Humboldt river is now used in irrigation.

On motion, a vote of thanks to Mr. Russell, for his interesting and instructive lecture, was unanimously passed.

It was announced that the subject for the next Saturday would be "The New Orcharding," by Dr. Thomas H. Hoskins, of Newport, Vt.

BUSINESS MEETING.

SATURDAY, January 16, 1892.

An adjourned meeting of the Society was holden at eleven o'clock, the President, WILLIAM H. SPOONER, in the chair.

William Patterson, of Quincy, was proposed by Charles E. Richardson; and Rufus T. Tobey, of Roxbury, by Henry L. Clapp; both as annual members of the Society.

The Secretary read a letter from Edgar Sanders, of Chicago, accepting the Corresponding Membership in the Society to which he had been elected, thanking the Society therefor, and expressing a desire to serve it in any way in his power.

Adjourned to Saturday, January 23.

MEETING FOR DISCUSSION.

THE NEW ORCHARDING.

By THOMAS H. HOSKINS, M.D., Newport, Vt.

[The Committee on Publication and Discussion are able to give only a brief summary of this lecture.]

Dr. Hoskins commenced by speaking of the history of fruit-growing in Maine and other Northern States, making especial mention of Dr. Benjamin Vaughn, of Hallowell, as one of the pioneers in Maine. The orchards of early days were composed entirely of seedling trees, and the favorite varieties were those which would keep longest. Time has greatly changed this; but in northern New England orchards composed wholly of seedlings are still to be found. The essayist spoke of his boyhood days in Gardiner, Me., and of his father's growing fruits there on grafted trees. He had one variety of pear, the Louise Bonne of Jersey, and several kinds of apples grafted. It was a long time before

farmers would take hold of planting grafted orchards, because they supposed there was a mystery about it; but this impression has been mostly dispelled by the wide dissemination of pomological knowledge, derived from scientific investigations by both private individuals and public institutions. To succeed in any department of husbandry one must know the laws of nature which control development in that department, and by experiment learn the best methods of directing their application to secure a desired result.

The increase of wealth stimulated the demand for not only more fruit, but better fruit; and with a better understanding of the principles of improvement, this demand was met. The introduction of railroads, and of ocean steam-navigation, were the means of extending markets by more rapid transportation. The recent demand for American apples in England — more than a million barrels having been sent there in a single season — shows that it pays to raise good fruit; and it also gave another impulse to the fruit-growing interest, causing a large extension of the acreage devoted to orchards, and multiplying new varieties of apples.

But before going abroad the home market should be carefully studied and fostered, not only because it involves less risk, but it will take many easily-grown varieties which cannot with profit be sent abroad, especially some of the finer early sorts.

The essayist thought one great mistake made in planting orchards was putting in too many varieties. The orchardist should learn what varieties are best adapted to his land, and then plant mostly of those sorts, and only in the fruit *garden* put the varieties which his fancy dictates.

When the crop is mature and ready for gathering comes the most difficult part of the orchardist's work, viz., the disposal of it to the best advantage. The essayist thought the time will come when apples will be generally sold on the tree, thus relieving the grower of the trouble of marketing. At times there may be a glut in the market, of apples as well as other fruits, and when this is the case the best will always sell first. He was convinced that no fruit of second quality would pay for marketing and it would be better to feed it to live-stock, and he had made arrangements to do this.

In growing apples it has been found that those raised in northern New England and on the Canadian border keep longer

than those from the latitude of Boston. The essayist condemned the use of flour barrels for packing apples, as too large. Apples packed in egg boxes have been shipped from Montreal to Liverpool, and have returned four dollars per bushel. Smaller packages are especially desirable for early apples, which are generally more tender and delicate than the later kinds. Thus packed they can be transported longer distances without injury, and therefore a much larger market demand secured.

Dr. Hoskins said that he raises his own trees, and he considers budded and root-grafted trees equally good, provided they are well grown. On level ground he plants them thirty-five by fifteen feet apart, and at the end of twelve years removes every alternate tree. His trees are largely of the "ironclad" varieties, which come early into bearing, and he prunes so as to give them all the light and air possible, as this adds much to the beauty of the fruit. He aims to bring them into a fan shape as nearly as possible.

In seeking desirable new varieties suited to his purposes he had experimented to a considerable extent with the hardy Russian apples, and found them thrifty, vigorous, and productive, but they are not suited to the latitude of Boston. Most of our fruits, other than native varieties, have been introduced from the western part of Europe; but from what he had learned, the study of the fruits of eastern Asia, and especially Mongolia, is very desirable. The late Charles Gibb was engaged in this study when his lamented death occurred, and the speaker believed that if this work were again taken up and encouraged some valuable acquisitions might be made.

DISCUSSION.

O. B. Hadwen said that he had been much interested in the lecture, going back as it did to the early history of fruit-growing. The Louise Bonne of Jersey pear first appeared at the exhibitions of this Society about 1840, so that it is not an old variety, as known to us. The Oldenburg apple was mentioned in Kenrick's Orchardist in 1833, and the Tetofsky was described by him as early as 1843. Apples are very particular as to their soil and location. The Yellow Bellflower does well in many sections of New England. The Fameuse is not as good here as in Vermont and Canada. Here it is an autumn apple, but he saw it at an exhibition at Ottawa in February. Apples grown in grass land keep

longer than those grown in cultivated land, and if apples are wanted to keep late they should be grown in grass; but the land must be kept rich enough for both crops, and the speaker found that if he attended properly to top dressing he got good crops of late-keeping apples from grass ground. He plants his trees forty feet apart each way, and finds that this gives opportunity for grass to grow and for teams to carry away the crops, and consequently he advises this distance on good land. On less fertile or hilly land he would plant closer. If the orchardist gives his time to it he will succeed in keeping away insects, especially the borer, which does not travel far or propagate rapidly. The tent caterpillar has been very troublesome, especially for the last two years; their eggs should be looked for and destroyed at this season of the year. They do not all hatch out at once in spring, and last season he spent three weeks in destroying their nests; but they are not always at home, and therefore in destroying a nest one does not necessarily destroy all its tenants. The codling moth is difficult to contend with; he had never tried spraying, but he keeps the bark clean so that the larvæ shall not harbor in it, and picks up all the fallen fruit; one year he fed eleven hundred bushels to cattle. Last year he tried the experiment of keeping sheep in his orchards to eat up the fallen fruit; it did very well early in the season, but later they were not equal to eating it all.

Dr. Hoskins said that the distance which he advised is that which he had found best for the Russian and ironclad varieties which he grows, for they do not make large trees. In land rich enough it is just as well to seed down to grass; he would use June grass or Kentucky blue grass. He finds that it pays to grow beans, either pea or yellow-eyed, between his trees; and he uses the stalks for mulching. It is a delusion to suppose that varieties which naturally bear only in alternate years can be made to bear every year by high culture. Refuse apples bring nothing in the market, and may injure the sale of the better ones.

Benjamin P. Ware said that his experience generally coincided with Mr. Hadwen's. Young orchards should be tilled, but when of sufficient age they may be laid down to grass. He would plant forty feet apart each way. Spraying with Paris green is a complete remedy for the canker-worm and codling moth. The latter lays its eggs in the calyx of the apple when it it small and has the eye uppermost, a position in which the spraying takes

effect. One spraying did not kill the tent caterpillar, but checked it; a later application was necessary to destroy it completely. He used the Paris green stronger than is commonly recommended, one pound to one hundred and twenty-five gallons of water, and it did not injure the trees. A new insect — the Bud-moth (*Tmetocera ocellana*) — has attacked the apple tree, perforating the leaves all over the tree, without, however, destroying it; spraying is a remedy for this and also for other insects.

It may cost eighty thousand dollars to destroy the Gypsy moth. His land lies alongside of the Boston and Maine Railroad. One caterpillar of the Gypsy moth came down on a train, and got off at his place. When its transformation was complete it laid its complement of eggs — from four hundred to eight hundred. His men found the original nest, and later four others, — probably colonies from the first. He was convinced that by spraying his trees he killed all but those four nests, and that if those had not been found before the worms had completed their transformation, his trees might now have been fully stocked with eggs. But he believes that all that were upon his premises were finally destroyed. He considers it important that the work of destruction of these pests should go on, and be done so faithfully, that the insects may be exterminated, as they eat everything where they go. There is one locality in Swampscott where every green thing was eaten, and he had friends in Medford whose premises suffered in a similar manner.

E. W. Wood said that the title of Dr. Hoskins' paper had excited his curiosity, and he was unprepared for the revelation that the fruits which succeed best in this State cannot be grown in Vermont, though he knew that some of our best apples cannot be grown in parts of Maine. It is well known, however, that our winter fruits improve in quality as we go northward. Maine and Canada apples bring the highest prices.

One great reason why farmers plant so few apple trees is the long time before they give returns; they must wait ten or twelve years, and so many farmer's sons leave the farm as to add to the discouragements to planting orchards. Nothing improves the appearance and value of a farm more than young, thrifty orchards. The speaker mentioned one man who bought a cheap farm and planted twenty acres of orchard, and also a vineyard. Now he employs five men on his vegetables, and from five to twelve in

gathering apples in autumn. He raised last year twenty tons of grapes, and fifteen hundred barrels of apples, receiving for both $4,000. What crop could give better returns with the same expense? This farm would now bring $20,000; without the orchard and vineyard it would not be worth more than $6,000.

There is in New England a great amount of land suitable only for orchards, so that farmers can have orchards without losing an acre of land valuable for other crops. Rough sidehills, exposed to air and sun, where no stagnant water exists, are eligible for this purpose; the roots will find their nutriment among the stones as these disintegrate.

He thought Mr. Hadwen's location was remarkably favorable for orcharding; his orchards are on strong clay soils. Apple trees are often planted in pastures where the sward is thick and close, but to give the best results they must be grown where they can be fed. They are generally an incidental rather than a main crop; when young the trees often have a hard struggle with cattle, and then the farmer wonders why he cannot get better prices for the fruit. The means of disposing of apples are constantly on the increase; the export in large quantities began about 1870. Within a radius of forty miles around Rochester, N.Y., six million bushels of fruit are evaporated annually; every part is used, the cores and parings being made into jelly. A dealer of whom the speaker inquired said that three-fourths of his canned fruit is imported, but there is no reason why it should not be grown and prepared here. This great demand for the foreign canned goods should encourage our own people to produce them more largely, especially the finer class of preserved fruits and vegetables.

Rev. Calvin Terry said that his observations corresponded with what had been said. Mr. Hadwen said the caterpillars are not always at home. There are times when they are sure to be at home: very early in the morning, before the sun strikes their nests, and again at mid-day, from eleven o'clock A.M. until about three P.M., they are always at home. Having eaten their breakfast, they go in to take a nap. Again, during a cold, chilly storm they will be found at home. Very early in the season — as soon as the nests appear on the trees — begin to destroy them; it is then easily done. In the late fall and during the winter the eggs can be found — a little glutinous mass — usually on the twigs of the last season's growth. They are then easily and surely

destroyed. Mr. Terry claimed that his fruit is of superior flavor; he finds no Baldwins equal to his own in that respect. The land was bought of a butcher, and a gravelly knoll upon it was filled with refuse from the slaughter-house, which gives permanent fertility for fruit trees, so that in color and flavor the fruit is always excellent.

Dr. Hoskins said that the apple maggot is much worse than the codling moth; for, while the latter makes but a single short passage in the fruit, the former perforates every part, rendering it utterly worthless. It preys mostly on early and sweet apples. It is the larva of a fly, the *Trypeta pomonella*. No effectual way has yet been discovered of checking its ravages.

The Chairman of the Committee on Discussion announced that on the next Saturday Charles V. Riley, Ph.D., Entomologist to the United States Department of Agriculture, would give some "Late Experience in Dealing with Insects Injurious to Fruits."

BUSINESS MEETING.

SATURDAY, January 23, 1892.

An adjourned meeting of the Society was holden at eleven o'clock, the President, WILLIAM H. SPOONER, in the chair.

Frederick L. Harris, Chairman of the Committee on Plants, read the Annual Report of that Committee, which was accepted and referred to the Committee on Publication.

Adjourned to Saturday, January 30.

MEETING FOR DISCUSSION.

LATE EXPERIENCE IN DEALING WITH INSECTS INJURIOUS TO FRUITS.

By Professor CHARLES V. RILEY, Ph.D., Entomologist to the United States Department of Agriculture, Washington, D.C.

While there is so much to be said about the various insects which affect our horticultural interests that to speak fully of any one prominent species would require an ordinary essay, I have found that the more informal the remarks given the more likely they are

to draw out discussion and consideration, and thus interest and instruct. I shall therefore adopt this plan, and under a series of headings make such remarks as I deem of most interest and advantage to you.

To understand some later efforts to destroy the Plum Curculio, it is necessary to emphasize prominent traits in its life history. Since 1869-70 — when by a series of experiments I established the fact — it has been known that there is but one generation produced annually. The beetles hibernate under leaves or bark, in woods or other sheltered places near stone-fruit orchards. They issue from such winter quarters as soon as or before the buds put out in the spring. Both male and female feed on the tender foliage for some time before the females have a chance to oviposit in the young fruit. While the nights are cool they hide under any shelter within reach. Where the base of the tree is kept clean, and the earth raked, chips laid round under the trees form a most satisfactory trap for them, as in the early morning they are somewhat torpid and easily killed. Later in the season the jarring process is one of the most satisfactory ways of securing an uninjured crop of fruit. The arsenical treatment is based on the habit of both sexes of feeding on the young foliage in the early season, and, secondly, on the habit of the female of gnawing with her jaws a crescent-shaped mark in order to form a deadened flap around the egg which she has thrust under the skin of the fruit. But a survey of the experiments with arsenites for the curculio will, I think, bear out my position, taken in 1885, when I indicated their possible value, yet that they would never be as effectual against the Curculio as against the Codling Moth. One thing to be considered in the use of arsenites against this insect is the effect of these mineral poisons on the different stone-fruit trees. There has been a good deal of conflicting experience, in reference to the peach particularly, and this conflicting experience is, without much doubt, to be explained in part by the varying qualities of the poisons themselves; by the methods of application; and to some extent by atmospheric conditions, and also the pathological conditions of the trees so treated. But it may be safely asserted today that spraying against the plum curculio is only partially successful, and the same may be said of other rhynchophorous, or snout-bearing beetles, which injuriously affect fruit, viz., the quince and the apple curculio and plum gougers.

Recent experiments made at a few of our experiment stations, which have sufficiently competent entomologists, have thrown much light on the comparative value of different arsenical mixtures as insecticides, and as to the relative injury they do to the foliage of different trees. The testimony of some experimenters would indicate that the peach is more susceptible to the influence of London purple than to Paris green, and that there is less danger of injury when the leaves are young than when they are old. The cause of injury by London purple is doubtless due to excess of soluble arsenic. Professor Bailey found that heavy spraying with one pound of Paris green to three hundred gallons of water did not injure the foliage. But perhaps the most valuable results obtained are those given by Professor Gillette, who states that London purple used with the Bordeaux mixture, in the proportion of one pound to fifty gallons, was entirely harmless to the peach and plum; that the oldest leaves are most liable to injury; that dews and probably direct sunlight increase injuries done by arsenites to foliage; that leaves kept perfectly dry can hardly be injured by them; that leaves suffering from fungous disease are more susceptible than healthy ones; that freshly mixed and applied London purple is most injurious, while freshly mixed and applied white arsenic is least injurious to foliage, but the longer the mixed white arsenic stands the greater the danger of injury; that lime added to London purple or Paris green in water lessens the injury they will cause to foliage, while lime added to white arsenic in solution increases the liability to injure the same unless the poison is first wholly dissolved, when the opposite effect is produced; that London purple can be applied without injury, eight or even ten times as strong if combined with common Bordeaux mixture instead of water; that arsenites cannot, by ordinary methods, be mixed in a kerosene emulsion; that they mix readily in resin compounds and seem no more injurious than when applied in water; that when put into strong soapy water they do much more harm than in clear water; that they mix readily in carbonate of copper solution and are as harmless as when in clear water, and that London purple in sulphate of copper solution is vastly more harmful than when in water only.

Many experiments have been conducted with a view to combine substances which are known to have both insecticide and fungicide qualities. While the results have been variable, it would appear,

on the whole, that the combination of an insecticide does not add to the efficiency of a fungicide, but often detracts from it; but the reverse of this does *not* hold true, as experiments have proved that while the Bordeaux mixture, combined with arsenites, does not act well as a fungicide, it is decidedly beneficial as an insecticide, as the arsenites can be used so much stronger. Professor Maynard found that one pound of Paris green in five hundred gallons of sulphate of copper solution proved very injurious to his trees, but that one pound of Paris green in two hundred gallons of Bordeaux mixture secured a very large crop of plums, while other trees, not treated, lost their fruit from the curculio. He also decided that the black knot was less upon the trees sprayed with this latter mixture.

The experiments by the Department of Agriculture in 1880 to 1883 resulted in producing a satisfactory remedy for the worst scale-insects and the orange rust mite of a large part of California, in the proper use of kerosene emulsion and sulphur. But in Southern California they have tougher insects; the kerosene and resin washes, though satisfactory, if properly used, in humid Florida, are far less so in the dry climate of South California. Now, Mr. Coquillett, an agent of the Entomological Division of the Department of Agriculture, has experimented quite successfully with hydrocyanic acid gas. It has been found during the past year that by fumigating the trees at night, or in a darkened tent, the best results are attained, and the least injury sustained by the trees. The tree is covered with a tent, after which one part of dry cyanide of potassium is placed in a generator — made of lead in the form of a bucket — which is set near the base of the tree; two parts of water are then added, and lastly one part of sulphuric acid. The bucket is then quickly covered with a barley sack, and the operator withdraws. Earth is thrown upon the base of the tent to prevent the escape of gas. After fifteen minutes the tent may be removed and the work is done. A tree fourteen feet high, with head ten feet in diameter, requires five and a half ounces by weight of cyanide, eleven fluid ounces of water, and four and a half fluid ounces of sulphuric acid, all costing less than twenty-five cents. I have no hesitation in recommending this treatment, even where large orchards are infested by surface-feeding insects.

The use of resin washes and their value against scale insects

has been fully established in California, and will become so in other parts of the country. The plants treated should be thoroughly coated over, which can be best done by a coarse spray. One of the best formulas is: Resin 18 pounds, caustic soda (70 per cent strength) 5 pounds, fish oil 2½ pints, and 100 gallons of water. The first three are put into a large kettle and covered with water, then kept boiling hard until all dissolved and for one hour afterward. The due proportion of water can be added when required for use, and the mixture run through a strainer to insure equality of consistency.

No more striking event has happened during the past two years than the extermination of the Fluted Scale (*Icerya purchasi*, Mask.), most destructive to the orange-growing interests in southern California. It is difficult for one unfamiliar with the facts to realize that this scale, which two and a half years ago hung like a blight and plague over leaf, branch, and trunk of all Citrus, and many other kinds of fruit trees and shrubs of southern California, has been so effectually swept away by the little Australian Ladybird, *Vedalia cardinalis*, which was imported for this purpose. In the language of Assistant Secretary Willits, "It seems almost like an entomological romance." The history of this scale, *Icerya purchasi*, has made everything pertaining to the same genus interesting, and during the past year four other species have come to my knowledge, — the *Icerya rosæ*, from Key West, and limited in its range; *I. ægyptiacum*, from Alexandria, Egypt; *I. montserratensis*, which occurs on the island of Montserrat, W.I.; and *Icerya palmeri*, found by Dr. Edward Palmer, in 1887, upon a grape vine, in the province of Sonora, New Mexico, but only on the Muscat of Alexandria variety. The practical lesson to be learned is, that our fruit growers of Florida, Texas, and California should take every care to quarantine all plants from infected foreign points until examination shows them free from such pests.

Professor F. L. Harvey, of the Maine Experiment Station, has made the most satisfactory investigation of the life habits of the Apple Maggot — *Trypeta pomonella*. It is a native American, and occurs on the wild haws and crabs throughout the Mississippi valley, but has not affected cultivated fruits there. It began to prove injurious to cultivated apples in the Eastern States, and this strain of the insect has spread west to Michigan, and has

now appeared in Arkansas. The larvæ attain full growth in four to six weeks; they leave the fruit through peculiar openings of the skin, and fall to the ground; if this is grassy, they probably hibernate in that protection. The larvæ from fruits tored in bins leave the apples, and assume the pupa state there. The perfect female possesses a sharp ovipositor with which she perforates the skin of the fruit and deposits her eggs — several in each apple. She is probably capable of laying from three to four hundred eggs. The remedy is frequent and careful destruction of all fallen fruit, and the burning of all refuse from bins and barrels.

It is a common remark of members of horticultural societies, whose meetings I have visited, that their insect enemies are on the increase. In one sense this is undoubtedly true, *i.e.*, the number of insects infesting our fruits and other crops constantly grows as our knowledge of them becomes more complete; but I question whether more injury is done to our fruits today than was done fifty or one hundred years ago. In fact, with the advances made in methods of warfare against fruit pests, the injury done is relatively less; still, as the area of fruit culture increases, so does the aggregate amount of injury and the number of species with which we must contend. To give you an idea of the vastness of the subject of economic entomology for a country as great as ours, I make a bare reference to the reports of insect injury — either quite novel or of species hitherto unknown — that have come to the Department within one year, many of which have probably been at work for many years, and may have changed their habits and begun eating cultivated plants; but whatever the cause that they have not been observed before, we call them new insects. Of these I shall mention:

A large, undescribed scale-insect of the genus *Lecanium* infesting grape vines at Hudson, O., and in Pennsylvania, reported by J. R. Adams.

An undescribed species of *Phytoptus*, making a gall on plum leaves, reported from Akron, O., and Pomponoosuc, Vt.

A new species of plant-louse, of the genus *Myzus*, reported as on the cherry, in southern Indiana.

A leaf-folder, probably *Cacœcia argyrospila*, was reported on the apple and gooseberry, at Fort Collins, and Denver, Col.

A hairy caterpillar, of the genus *Halisidota*, reported on the apple trees at Highland, N.C.

Another hairy caterpillar, of the family *Arctiidæ*, previously unobserved, was injurious to the mulberry, pear, and apple, in Winchester, Mass.

A new species of plant-louse, infesting the leaves of orange trees, at Los Angeles, Cal.

An *Allorhina* — a large chafer belonging to the rose-bug family — was quite injurious to fruits, at Tombstone, Ariz.

An undescribed *Aphis* reported on the pear, at Lafayette, Ind.

An *Aleurodes* found on strawberry leaves in the District of Columbia; also a new species of plant-louse.

Sparthocerus diffusus has been very injurious to grape vines in Waldo, Fla.

A large scale-insect, of the genus *Lecanium*, reported on strawberry leaves at Urbana, O.

A new leaf-roller, of the genus *Semasia*, was found on apple trees near St. Louis, Mo.

A new "miner," belonging to the genus *Lithocolletis*, has been found in the epidermis of peach twigs, at Napa, Cal.

A fire-blight beetle, *Xyleborus dispar*, long known in Europe and our Eastern States, has been injurious to certain fruit trees in Nova Scotia.

A new span-worm was found on apple trees at Lafayette, Mich.

A small mite, probably *Phytoptus pruni*, was injurious to Damson plum trees at Berlin Cross Roads, O.

A little case-bearing, lepidopterous larva, of the genus *Coleophora*, was reported as destroying peach buds, at Akron, O.

A new species of *Lecanium* was found on twigs of plum trees at San José, Cal.; and another species of the same genus injured the peach at Ithaca, N.Y.

Chrysochus cobaltinus was found injuring leaves of young peach trees at San José, Cal.

An unknown lepidopterous larva, of the genus *Hyphantria*, was reported as damaging apple and some other trees, at Omaha, Neb., and Brownwood, Tex.

Platypus compositus, a bark-borer, hitherto unknown to have such habits, was found boring into the trunks of orange trees, in Lake county, Fla.

A saw-fly larva, *Janus flaviventris*, Fitch, has been found in the stems of currant bushes, at Adrian, Mich.

A case-bearer (undescribed) belonging to the genus *Coleophora*, was reported on orange trees, at Los Angeles, Cal.

An undescribed mite of the genus *Tetranychus*, the same genus to which the Red Spider belongs, was found on lemon trees, at Los Angeles, Cal.

An undescribed *Thrips* has been found on orange trees, at Los Angeles, Cal.

A leaf-hopper, *Typhlocyba rosæ*, has been very numerous on leaves of apple trees at Burlington, Vt.

A canker-worm, genus *Anisopteryx*, was found on the plum at Elliott, Cal.

A snout-beetle, *Cercopeus chrysorhœus*, belonging to the same family as Fuller's Rose-beetle, was found on the grape vine at Paris, Tex. It is supposed to be the "grape curculio."

A currant stem borer, *Oberea ocellata*, was found breeding in twigs of peach trees, in Harris county, Tex.

A new span-worm has been found feeding on the bark and young twigs of plum trees, and doing considerable damage at Mitchell, Ind.

A new case-bearer, genus *Coleophora*, was found on buds of the blackberry, in parts of Indiana.

A beetle-larva, of the family *Tenebrionidæ*, and somewhat resembling a wire-worm, has greatly injured the roots of peach and plum trees in Southern California.

An undescribed bug, of the genus *Trapezonatus*, has been very injurious to fruit trees in Lead county, Idaho.

A beetle, *Ptychodes trivitatus*, has been reported as girdling twigs of fig trees at New Orleans, La.

Another snout-beetle, *Tricolepis inornata*, of the same family as Fuller's Rose-beetle, has been devouring the foliage of young prune trees at Salem, Ore.

A plant-louse — undeterminable — infested orange leaves badly, at Santa Barbara, Cal.

A larva of some *Heliothis*, the same genus as the Boll-worm, caused great injury to the leaves of the apple and quince, at Cœur d'Alene, Idaho.

A true bug, an undetermined species of the genus *Lygus*, injured young pear trees at South Byron, N.Y.

Two leaf-eating beetles, *Fidia longipes* and *F. murina*, destroyed the leaves of grape vines, at Vineland, Ark.

Another leaf-beetle, *Haltica villosa*, was very injurious to grape foliage, at Socorro, N.M.

A scale-insect, *Chionaspis biclavis*, probably introduced from Tahiti, was found on orange twigs, in California.

A leaf-hopper, *Stictocephala inermis*, has proved very injurious to young peach trees, at Tehama, Cal.

Among the most important of the newer insect enemies of the fruit grower is the flea-beetle, *Haltica ignita*, which has lately proved very injurious to both the strawberry and the peach crops, in Orlando and Lake City, Fla.; in Waco, Tex.; and in some localities in Indiana.

Another pest is a new flat-headed borer, belonging to the family *Buprestidæ*, which has been quite destructive to the Sharpless strawberry at Cœur d'Alene, Idaho. This is a remarkable fact, not only because the species with which it belongs have hitherto been found boring under the bark of hard-wood trees only, but because the specimen belongs to an undescribed species of *Chrysobothris*, the same genus to which the flat-headed apple tree borer belongs. In company with it was an undescribed lepidopterous crown-borer.

The foregoing list shows that the number of species annually added to the long list of our fruit pests is great enough, whether of species hitherto unobserved, or of species which have transferred their work from our wild to cultivated plants. But the number is constantly augmented by additions from abroad, and these are more to be dreaded than the native. I will call attention to two which it behooves all peach culturists to keep out. First, is the *Ceratitis capitata*. This is the larva of a two-winged fly having the same general habits as the Apple Maggot. It may not thrive in our Northern States, but the peach crops of Georgia, and allied fruits in Florida, are in danger from its possible introduction from Bermuda, where it is extremely destructive. Second, the Japanese Peach Fruit Worm. This insect, according to Professor Sasaki, is a species of *Carpocapsa*, and very closely allied to our Codling Moth; hence it is called by him "a new codling-moth, injurious to the peach." During some seasons more than ninety per cent of the peach crop of Japan is injured by this insect. No remedy has thus far been found, but arsenical preparations may yet be made successful. But by the aid of competent customs officials to inspect all fruits and plants that arrive at our ports, the intro-

duction of these pests may be averted. Government aid should be thus afforded.

The introduction of the cyclone nozzle; the discovery of the value of the kerosene emulsion; the resin washes, and the hydrocyanic acid treatment — all of which have resulted from my work for the United States Government — together with the discovery of the Bordeaux mixture as a fungicide, have virtually revolutionized our methods of dealing with insect diseases; so that the advance in the last few years is unprecedented in the history of horticulture. The first four discoveries resulted from previously conceived and well planned courses of experiment having for their object the very result finally obtained. They may be considered as illustrations of results obtained by the scientific and experimental method, while the Bordeaux mixture was a chance discovery. The use of these five discoveries is now almost universal. If we add to them the spraying with arsenites, but little longer in use, we get a good view of the great advances made in the last few years in combating the insect enemies of fruits and fruit trees. Is that splendid progress to stop? I trow not. The truth is that fruit growing has come to be a business involving much special knowledge based upon scientific data, and the intelligent fruit grower will come to look upon the insect hordes that attack his trees and fruits as a not unmixed evil, but rather as a blessing in disguise, making it unprofitable for his negligent or ignorant neighbor, and securing for himself all the greater reward for his industry and intelligence.

Discussion.

William C. Strong wished to express how much he felt that we are indebted to Professor Riley for his valuable services in the study of the insect enemies of the fruit grower; and also for his success in discovering effectual remedies or preventives of their destructive ravages. The whole country is under great obligations to him, because his work has included the pests of every part of our land. The speaker had during the past year used sulphate of copper alone with much success, and thought it sufficient. He quoted from "Meehan's Monthly" the statement, in the December number, that at Egg Harbor City, N.J., where the whole prosperity of the population depends upon its grape crop, mildew and black rot had become so destructive as to threaten the

total ruin of this industry. Under the advice of Professor Lamson Scribner, spraying with the solution of sulphate of copper was introduced, and it had proved remarkably successful. Mr. Strong inquired why the addition of lime was recommended.

Professor Riley said he thought sulphate of copper was undoubtedly sufficient in most cases. When in France, in 1889, he visited many vineyards which were treated with sulphate of copper alone, and he noticed that the foliage presented a peculiar glaucous-green appearance. He thought that with a small admixture of lime there was less danger of injuring the leaves. One advantage of using the sulphate of copper alone is that a simpler nozzle can be used. Still he thought the cyclone nozzle more economical to use, especially if the Bordeaux mixture was likely to be used at all, as these nozzles are so much more easily cleaned.

William H. Hunt said he had used the Bordeaux mixture to prevent black rot on grape vines, with a measure of success; but found some difficulty in applying it, the lime clogging the nozzle. He considered the sulphate of copper much more easy of application, and a pretty sure remedy for the Codling Moth if combined with Paris green, and used at the right time. The use of the Bordeaux mixture on potatoes was not a complete success in preventing rot, but possibly he did not use it often enough.

Professor Riley said that in this part of the country there are two broods of the Codling Moth — *Carpocapsa pomonella* — annually. The eggs are laid in the calyx or blossom end of the apple soon after the petals fall; and as soon as the egg is hatched, the worm gnaws its way into the fruit, where it is safe from all arsenites, or other poison-spraying. Therefore it is necessary to spray the trees as soon as the flowers begin to fall; and if the weather be rainy, to repeat the spraying some two weeks later, when the flowers have all dropped, and the young fruit is forming. The slightest quantity of arsenite will kill the newly hatched worm. The second brood of worms remains in the larva state through the winter, and will not amount to much if the first brood has been checked. The Apple Maggot — *Trypeta pomonella* — infests the fruit throughout the summer; there are several of them in each apple. It was first described by Walsh in 1867.

J. W. Manning said he knew the apple maggot in Chelmsford, in 1847, where it was then doing considerable damage.

O. B. Hadwen had listened to the address with great

pleasure. He had never used poisons on his fruit trees, but to rid his place of insect enemies of the worm sort he had all apples containing the worms gathered up promptly and disposed of before the insects left them. He had never discovered where the Apple Maggot entered the fruit, and asked if the essayist could inform him.

Professor Riley answered that the female insect has a very fine, sharp ovipositor, with which she pierces the skin of the apple anywhere she pleases to deposit her eggs. Generally several are deposited in each fruit attacked. The maggot, when hatched, lives upon the juice and soft parts of the pulp of the fruit. The wound made by the ovipositor appears to do no harm. The lecturer alluded to the fact that London (Eng.) purchasers of American apples feared that our practice of spraying fruit plants with arsenites and other poisonous compounds threatened danger to the consumers of such fruits. He said that by a most liberal calculation a man would have to eat forty barrels of apples to get enough poison to do any harm. But it is different with grapes, for in a dry season some of the poison may cling around the stems or between the berries, although after the necessary handling which the fruit receives in gathering and marketing it, there could be very little left when the fruit reached the consumer, especially if the spraying had been done early.

J. W. Manning asked why the effort initiated by the State to exterminate the Gypsy Moth had so generally failed.

Professor Riley said that he had purposely avoided any mention of the gypsy moth in his remarks before the Society, not only because he had treated the matter fully in one of his Lowell Institute lectures, of which quite a full report had been published in the "Boston Commonwealth," but because it was a subject upon which he could not speak without the appearance of fault-finding. He believed that the mistake originally made was that the work had not been directed in the beginning by a specialist. He believed that at least one of the commission should have been a specialist familiar with entomological matters, and particularly with applied entomology, and experienced in spraying. He doubted whether at this time we could get rid of the gypsy moth. It had, he feared, got beyond control. Nevertheless, while it may continue its ravages, private effort would be able to keep it in check. Unless some effort on a sufficiently extensive scale to

exterminate the insect were made, he could not see any justification for further State effort. To continue as heretofore, without exterminating, would, in his judgment, be to a great extent a waste of time and money, and doing by special commission what should be done by private parties concerned.

Francis H. Appleton, a member of the Committee of the State Board of Agriculture on the Gypsy Moth, thought Professor Riley had been misinformed. He stated that the committee had selected scientific persons whom they judged competent to give reliable directions. Whenever there came before the committee any question bearing upon the scientific side of their work, they always sought what they considered competent advice. When they organized, it was understood that the moth extended over only a certain territory; but when they commenced operations they found that it was much more widely spread. They acted upon their own judgment, under the advice of scientists, and believed they had greatly reduced the pest in the area infested.

Professor Riley spoke of the work done by the previous commission on the Gypsy Moth. He had no desire to cast reflections on any of the members of the present commission, all of whom he knew personally and believed to be animated by the proper patriotic spirit. But the personal character of the members of the committee had not affected the faults to which he referred. Errors had been committed which should have been avoided. He had been invited by the members of the present committee to take part in a conference on the subject held in March, 1891, and had freely given his views. He had made it a point since, from the general interest he felt in the subject, to follow the course pursued the present year, and had frankly spoken to Mr. Sessions, the Secretary of the Board of Agriculture, of what he believed to be shortcomings. Professor Fernald was, later in the season, in some way connected with the committee, and the speaker had no doubt that, if the work is to be continued, the present committee, with the experience it has had, could hardly be improved upon under the present mode of appointment and if an entomologist is not to be placed in active charge. The question in the mind of the speaker was whether to go on in the present way, with no certainty of extermination. He believed that with a view to the extermination of the pest a much larger appropriation than that now asked for, say half a million dollars, would be necessary, and in his

judgment, only on the basis of a supreme effort being made for extermination was a continuation of the work warranted.

Mr. Appleton responded by saying the present commission took hold of this work a year ago. They consulted Professor Fernald, of the Massachusetts Agricultural College, and were guided by his advice. The speaker felt that this undertaking was somewhat of the nature of the suppression of an insurrection, and that the best way was to use sufficient power to crush it at once. He hoped the investigation now going on by the Legislative Committee would be thorough, and that it would bring to their attention what is needful to do to secure the extermination of the gypsy moth.

George M. Whitaker remarked that Professor Fernald had stated that the farmers and gardeners are taxing themselves, as nearly as he can estimate, $75,000 per year, on account of the devastations of the potato-beetle — not to exterminate it, but merely to keep it in control. Now if it should prove that present methods and expenditures do not succeed in exterminating the gypsy moth, which preys upon practically *every* kind of vegetation, an investment of $75,000 per year, merely to keep it in control, is certainly wise, and justified in view of the practice of the farmers of the State in connection with the potato beetle, which attacks only *one* kind of plant.

Benjamin P. Ware was glad to hear a word of encouragement from Professor Riley to the effect that insects may be kept in check. Farmers have thirty insect pests on each crop; they should be glad that they have not thirty-one.

Mr. Jackson asked about plugging with sulphur.

Professor Riley said that this was another of the exploded remedies which nevertheless continue to be advocated year after year. He had tried the plugging of trees with sulphur, and knew positively from experience that the sulphur remained indefinitely without being taken up into the circulation of the tree. The fact that a similar plugging practice can be permitted on the Common, right here in Boston where there are so many naturalists, both botanists and entomologists, is a striking illustration of the difficulty of inculcating scientific truths wherever politics have anything to do with the matter. Since he had been in Boston he had noticed, while crossing the Common, that many of the trees had been very elaborately tied up to wooden stakes, in many

instances in such a manner as to form splendid harbors for the cocoons and egg masses of the Tussock Moth, notwithstanding the difficulty which had been experienced in Boston during recent years with this insect.

William Tailby asked if the hydrocyanic acid gas fumigation was not dangerous to the operator.

Professor Riley replied that he had been present at such applications on a small scale, but had never known or heard of any harm coming from its use. The operator always retires before the gas is generated to a harmful extent.

On motion, a vote of thanks to Professor Riley for his able and interesting address was unanimously passed.

O. B. Hadwen, Chairman of the Committee on Discussions, announced for the next Saturday a lecture upon "Irrigation with Fresh Sewage," by Henry J. Barnes, M.D., of Boston.

BUSINESS MEETING.

SATURDAY, January 30, 1892.

An adjourned meeting of the Society was holden at eleven o'clock, the President, WILLIAM H. SPOONER, in the chair.

Louville Curtis, of Tyngsborough, was proposed by Robert Farquhar, as an Annual Member of the Society.

The President read a letter from Francis Brown Hayes, enclosing fifty dollars, which he wished to offer as a prize for the best fifty trusses of rhododendrons, in not less than twenty-five varieties, at the Rhododendron Show, on the 4th of June. The President stated that the Executive Committee had accepted the gift with thanks.

Adjourned to Saturday, February 6.

MEETING FOR DISCUSSION.

IRRIGATION WITH FRESH SEWAGE.

By HENRY J. BARNES, M.D., Boston.

In 1887 Mr. William D. Philbrick stated the three essential things for a good market garden to be "nearness to a good

market, a good soil, and sufficient capital." To-day the control of an abundant supply of water will be admitted as a factor of equal importance to those he enumerated. I believe it was an honored member of this Society who emphasized this in saying that the three things necessary in the cultivation of strawberries were *water*, WATER, WATER; and probably it is unnecessary for me to remind you of its value in view of its recognition in the earliest history of agriculture, and your own experience in the arrest of growth and often destruction of crops in the absence of this necessary element.

In the composition of fruits and vegetables it exists to the extent of from fifty to ninety per cent, and, becoming charged with the various soluble substances in the soil, is the vehicle which conveys them from the soil to the vegetation.

Boussingault observed rich crops of maize on the plateau of the Andes at Quito, in sand that was nearly moving, but abundantly watered, and remarks that "land which can be irrigated has only to be loose and permeable in order to have the whole of the fertility developed which climate and manure can confer."

At Edinburgh I have seen rich crops of vegetables, raised on soil composed of sand and capable of furnishing only mechanical support, under irrigation with sewage, and commanding an annual rental of from $100 to $125 per acre; and in the vicinity of Boston we have ample proof of the value in the numerous water plants set up and maintained by many farmers.

To ensure rapid growth a plant must be provided with all the moisture it is capable of absorbing.

Water, carbonic acid, hydrogen, oxygen, nitrogen, ammonia, and a few earthy minerals in small amounts, are the well-known elements upon which vegetation subsists. In solution through the roots, or in gaseous form through the respiratory process of the foliage, nourishment is obtained, and as we cannot control the food supplied in the air they breathe, our efforts are confined to supplying the roots with water, carbonic acid, nitrogen, ammonia, phosphoric acid, and potash, under the broad name of fertilizer, the commercial value of which depends upon the amount of each or all of these elements it is capable of furnishing; and to the plant it makes no difference, either in its structure or development, from what source these inorganic elements are derived. Artificial fertilizers, guano, night-soil, barn-yard products, or

sewage, must each and all be resolved into these simple component elements before assimilation is possible. (Dr. Carpenter records a rare exception to this rule, having observed bacteria passing through the rootlets of Italian rye grass, and disappearing as if digested by the plant. The insectivorous plants should also be excepted.)

Plant food must be decomposed before it can be recomposed, and based upon this fact the composting of manure is practised.

Up to within a comparatively recent period, exposure to the influences of the oxygen in the atmosphere was supposed to be the essential factor in promoting decomposition of organic matter. The study of bacteriology has broadened our knowledge, and revolutionized a theory.

Tyndal demonstrated that a free atmosphere was insufficient to cause any change in meat extracts exposed in open mouth phials, in a mountainous region of Switzerland, owing to the absence of micro-organisms; and Schlœssing, a French chemist, showed, by adding chloroform to sewage deposited on soil in a free atmosphere, the effect of arresting decomposition as often as applied, by putting to sleep these organisms. By heat, the bacteriologist destroys them and preserves the organic matter of his culture fields for an indefinite time, in test tubes plugged with sterilized loose cotton stoppers, which have the effect of excluding micro-organisms, but freely admit air. In the preservation of fruits, they are killed by boiling, and excluded by sealing. In the preservation of timber, they are poisoned by a variety of agents in which it is soaked. Thus the decomposition or decay of organic matter may be prevented by anæsthetics, antiseptics, or boiling. Their existence in the air may be recognized as floating specks in the sun's rays admitted to a darkened room through a narrow aperture.

The object in composting manures is to expose as much of the surface as is possible to the action of these organisms which pervade the air, and exist very abundantly in the first few inches of the surface of the earth where organic matter is present. In inorganic matter, like gravel and sand, they are often absent, and always very few in number. At the Lawrence Experiment Station, it required several months to stock the filter beds, composed of gravel and sand, during which period nitrification of sewage did not take place. They subsist chiefly on nitrogenous

matter, and by digesting it convert it into matter capable of combining with chemical elements in the soil or air.

Mr. Cohn claims to have demonstrated that the reduction of sulphates into sulphuretted hydrogen and sulphur, and nitrates into nitrites, ammonia, and nitrogen gas, is accomplished through the agency of microbes; and another experimenter has shown that certain bacilli have the property of changing ammonia into nitrous acid, etc. Our State Board of Health recently have reported the isolation of a nitrifying bacillus.

Reduction by physiological rather than by chemical processes is, in a measure, confirmed by what we know of the origin of natural nitrate beds, and long ago by feeding a falcon on flesh alone Boussingault found the urine to contain scarcely anything but uric acid; and we may fairly conclude that the oxygen in atmospheric air has no office in the processes of reduction, except that it appears to be necessary to life, and takes up, or makes combination with, elements set free in the reduction of organic matter by living organisms. An exception should be made where matter is burned by heat, in which event nearly all its fertilizing properties escape into the atmosphere in the form of gases, leaving only the ashes containing the salts.

In the manure pile, reduction begins with the animal which produces it, and in turn it serves as food for a great variety of lower organisms, until its final conversion into inorganic matter. Here the volatile gases escape to a greater or less degree, as illustrated in the ammoniacal odor of horse dung or urine. It has been shown that nearly two-thirds the original amount of ammonia may thus be lost in a pile of horse dung. In the more moist manures, like cow dung, active change does not take place, except on the outside of the pile; the nitrifying organisms are excluded in its compact condition as effectively as in the silo where ensilage is preserved. In the compost heap, reduction is arrested at a point where the elements set free are capable of combining with those in the soil; for example, the strong affinity which ammonia has for the alumina in all fertile soils fixes the ammonia in the form of ammoniacal sulphate of alumina, and preserves it from further reduction into elements possessing but five per cent of its original value for agricultural purposes, according to Dr. Carpenter's estimate.

Nitrate of potash is artificially produced by emptying animal

refuse — more especially urine — into vats containing calcareous earth, ashes, and loose soil. In composting manure, except that the greater part of that which furnishes the ammonia is lost through no effort to save the urine, practically the same result is obtained, namely, that valuable fertilizer, nitrate of potash.

Top dressing with green manure, if lumpy, is attended by a loss of valuable gases imparted to the atmosphere, excepting what the rain dissolves and washes into the earth.

Fortunately, in the economy of nature, nothing is lost. All which is taken up in the air serves as nourishment for plants through their respiratory action, or comes down with rain or snow and is known as the poor man's manure. Thus an offensive odor becomes an unconscious dispensation of charity by the person responsible for its creation.

Liquid manure, if spread on the surface of permeable land, immediately disappears, but capillary attraction retards the flow and holds it in suspension during a rapid process of nitrification.

Silicious sand will hold 25 per cent of liquid manure without dripping; sandy clay, 40 to 70 per cent; strong clay, 50 per cent; arable soil, 48 to 52 per cent; garden soil, 89 per cent. No labor is required in this method of composting, except that the flow on a given area of land must be diverted to another field from time to time. By this method of enriching land, all the fertilizing properties of the manure are retained in the soil for the benefit of vegetation.

In consequence of the rich nitrogenous food upon which the human race subsists, analysis shows its excreta to be richer in plant food than that of other animals. In a pound and a quarter of urine and a quarter of a pound of fæces the three per cent nitrogen amounts to about 0.531 an ounce a day, or 12.815 pounds per year. One hundred pounds of the urine of a man is equal to one thousand three hundred pounds of the fresh dung of a horse, according to Boussingault and Liebig. Experience with the use of human waste, as ordinarily obtained, discredits the accuracy of analysis, and today it is with some difficulty in many places that farmers can be found who are willing to accept it as a gift; and they do not err in placing little or no value upon it, for long before it reaches the farm, it has lost most of its fertilizing properties, either by complete decomposition, or by washing away by floods of water into the earth or sewer, leaving only a sludge

composed chiefly of paper and grease. None of the urine, containing most of the nitrogen and all the soluble salts, is saved. If obtained from a tight cesspool, the volume of water renders transportation impracticable. Where earth is used to absorb the liquids of a vault, it is a valuable fertilizer; but as a matter of fact little night-soil is obtainable in this condition.

Of the various modern methods adopted in thickly settled communities for the disposal of wastes, sewerage systems discharging on soil under cultivation offer the cheapest transportation, and the best means of preserving the fertilizing properties. In transit it loses little by decomposition, if the flow is uninterrupted, for only in stagnation do the micro-organisms find environments favorable for propagation and work. Experiment in England has demonstrated that a river carrying 10 per cent of sewage, and running at the rate of one mile an hour, would not lose over 25 per cent of carbonaceous matter, and 33 per cent of the nitrogenous in a journey of one hundred and ninety-two miles; and German authorities maintain that there is practically no loss in covered conduits, a fact which your own sense would confirm in the absence of offensive odors on entering a great sewer. Based on this common observation, Dr. Carpenter asserts that the sewage of London could be conducted a distance limited only by the cost of construction which, in a measure, would be offset by diminution in the cost of land more remote from the metropolis.

The name of Alfred Carpenter is well known as a high authority in sanitary science. In 1856 his influence established the Croydon farm, and it is now twenty-four years since he introduced this method of disposal to an assembly of men of science, especially called to consider the subject of town drainage. At the annual meeting of the British Medical Association in 1888, he said: "It is difficult to prove a negative. I assert that disease germs are of two kinds, corresponding with active germs and resting spores — eggs hatched and growing, and eggs unhatched. The hatched eggs are rapidly destroyed by the physical conditions under which they arrive at the farm. Exposure to air, a lower temperature than that necessary for warm-blooded creatures, absence of pabulum, and presence of injurious gases soon destroy their life; but the resting spores (unhatched eggs) are more persistent. They certainly arrive on the farm, and it might be expected they would do mischief, and so they do (and would) if the sewage is not imme-

diately applied to the land. But then, if arrested, Nature comes to our rescue, and destroys them by the sulphuretted hydrogen, which is engendered as soon as putrefaction is rampant; but putrefaction destroys the chance of a satisfactory financial return from the use of the sewage, and it is not to be encouraged. As soon as the resting spores come in contact with the spongioles of plant life, they are taken up with avidity, and taken in as food most energetically, much as human beings take in oysters when they get the opportunity. Some classes of plants which I have presumed to name carnivorous, among which I place rye grass, do assimilate these germs in the most rapid and satisfactory manner, so that no particle escapes their devouring power, and the effluent, so far as my observation goes, is absolutely free from their presence. . . . If sewage is kept moving it may travel any distance. The farm may be forty miles from the town producing it, but if so, the cost of transit will be large, which may be counterbalanced by cheaper cost of land. . . . . I earnestly recommend sewage farming as applicable to all water-closet towns without exception, and feel sure it will be far more satisfactory than for it to be sent into the Thames, the Mersey, or the Clyde, to the gradual destruction of our water-ways, and the removal from our midst of that which will give sinew, muscle, bone, and marrow to the people." In a long interview with Dr. Carpenter, he maintained these views with great force, but lamented that the management of the Croydon corporation had been delegated to politicians ignorant of sanitary science, who were wasting the products of the farm by preventing consumption on the land and thus were playing into the hands of the rich cow-keeper and others, to the pecuniary disadvantage of the city. This he pronounced a monstrous perversion of common-sense.

Until sewage reaches its final destination, it remains fresh; the rotten-egg odor, peculiar to it when undergoing decomposition, is absent, and if immediately applied to land, no offence is experienced in its nitrification, as it is at once composted in the most effective manner known; and the well-known results from grazing and folding sheep, where dung and urine are necessarily deposited on the soil fresh, are indications of the benefits which may be derived from the employment of what you would term a green manure.

The richness of sewage in nitrogenous matter and fertilizing

salts depends chiefly upon the amount of water consumed per capita, the proportional number of water-closets, street washings, and sink-drains conveying more or less to a sewerage system. At best it cannot be estimated higher than the discharges of one individual to sixty gallons of water. This is equivalent to about two barrels of water in which is deposited a pound and a half of material capable of supplying plant food. It is too dilute to be transported profitably by any method except water carriage, and an enormous volume must be employed in order to obtain sufficient material to nourish crops, for you get only about one pound of nitrogen in eight tons of water. On this basis of estimate, 500 persons would, in a year, produce 820 pounds of nitrogen, and 10,950,000 gallons of water, which, if applied to an acre of land, would be equal to 30,000 gallons a day. This amount has been considerably exceeded on the light porous soil of Gennevilliers, near Paris, without overburdening the capacity of the land. At the Lawrence Experimental Station, an amount equal to 60,000 gallons per acre per day has been nitrified for five consecutive months, to such an extent as to produce an effluent containing only five per cent of the original amount of ammonia in the sewage.

The capacity of land to dispose of sewage is fixed at a point where it becomes waterlogged. It varies in accordance with the character of the soil and relative amount of moisture in the atmosphere. For example, at Croydon, England, in a naturally moist climate and a clay soil without underdrains, this capacity is only equal to about 3,500,000 gallons per acre per year. At Gennevilliers, in a dry climate, on a light sandy soil, underdrained, 12,000,000 gallons per acre per year, or the wastes of 550 persons, have been advantageously employed.

Growing vegetation also contributes to the capacity of land to dispose of water. A full-sized cabbage has been known to exhale moisture at the rate of a pailful a day. Hales's experiment with a sunflower showed it to be capable of throwing off an average of twenty ounces of water a day, diminished at night or as the air was moist; and Bailey Denton estimates the capacity of an acre of growing wheat to be equal to ten tons of water each day.

When land is waterlogged vegetation dies, as is noticed where a sink-drain discharges without interruption in a non-perforated flower-pot, or where artificial reservoirs have been built; and for

this reason alone the number of persons whose wastes can be provided for on an acre of land varies from one hundred to five thousand. With this limitation sewage can be deposited on land in sufficient quantity to test its full capacity for the disposal of water.

Plants for irrigation with sewage differ in no way from those established where pure water is employed, except that the open carriers must, from time to time, be renewed, or the bed be disturbed, in order to avoid offensive odors from the thin skim of deposit. Under all circumstances, the discharge must be intermittent, that the land may not become waterlogged; and also to provide for frequent admission of air; as one writer expresses it, "the land must be given a chance to breathe." Under such conditions the land does not become clogged or choked. The water causes it to swell, and in drying it shrinks, leaving more space than exists where water is not applied. The earthworms contribute to making it more porous and light. In utilizing the wastes of kitchen sinks, I have always found that old channels will carry a given amount of liquid only about half the distance of those freshly made.

Irrigation is as effective in making garden soil light as is a fall of rain.

No great amount of labor is required to conduct the distribution. For the four hundred and fifty acres at Edinburgh under irrigation, only two men are employed, one by day and one by night, grass being the chief crop, and sewage the only fertilizer. Where vegetables are raised, the sewage is discharged on beds and finds its way between the rows in the same way that pure water does when employed for a like purpose.

During the long period when vegetation slumbers, it may be discharged broadly over fields at regular intervals with very little attention; and during that time the land will accumulate and store fertilizing elements for the succeeding crops. It must not be discharged on the foliage of vegetation, as there is a liability of arresting and conveying infectious germs to the consumer. Intestinal worms are very common among the Chinese as a result of the filthy practice of pouring slops on celery and other vegetables used without cooking. For this reason a strawberry bed should not be irrigated after the fruit has set.

Variation in the character of the soil, the climate, and the

vegetation makes any fixed rules governing the application of sewage impossible; but in a general way it may be stated that land which is benefited by irrigation with water can, by the use of sewage, be made more productive; and such soils as are capable of receiving the wastes of five hundred persons in the course of a year need no other fertilizer to produce the best results under intensive culture.

Frost does not prevent its application to land in winter. At Dantzic and Pullman it is continued throughout the winter with the effect of keeping out the frost; and at Edinburgh, the first crop of grass is cut on the irrigated field before a sign of fresh vegetation appears on adjoining land.

In 1867 and 1868, Paris, vexed by the increasing pollution of the Seine which Belgrand's great work of constructing intercepting sewers along each bank had only succeeded in transferring to a point lower down the river, was required by national authority to either purify or discontinue the discharge into the river. Immense sums of money were spent in efforts to filter the sewage, and to treat it chemically, but all were abandoned as inefficient. An experimental field of a few acres was established near Clichy for irrigation and utilization, with such happy results as to lead to the adoption of this system of treatment on the plains of Gennevilliers in face of the most violent opposition of the villagers, who were apprehensive of total annihilation of the value of their property on its introduction. Unfortunate experiments, resulting in costly litigation, greatly retarded the work; but the drains were finally laid, and the object lesson presented in a field nearly barren before the sewage was applied proved sufficient to induce the villagers to gradually accept the system, and from a field of less than an acre in 1868, it developed into an area of over 1,275 acres in 1882; and now embraces all available land in the district, and provides for the utilization and purification of one-third of the sewage of the city, or a little over 34,000,000 gallons per day. The population increased 35 per cent in ten years, reaching 3,500, nearly all engaged in agriculture. The land commands a rental five times greater than adjoining land, or the same land before irrigation was introduced; and the authorities of Paris, becoming so thoroughly convinced of the profitableness, declined to extend the system further for the benefit of private

land-owners, but acquired of the State sufficient land in the forest of St. Germain, at an annual rental of about nine dollars and fifty cents per acre, with the privilege of buying at three hundred and twenty dollars per acre, for the utilization of sewage not provided for.

Inside the fortifications of Paris, surrounded by beautiful exhibition buildings, including the Trocadero, which was but a few hundred feet distant, the city exhibited a model of sewage farming as conducted at Gennevilliers. A tract of land, about twenty-five by one hundred and fifty feet, was prepared for this purpose. At one corner an excavation enabled the visitor to descend a flight of steps, and view the character of the soil through glass set in the stone wall. Ten or twelve inches of the surface was black loam; then there was a stratum of yellow underlaid by beds of sand and gravel. It was underdrained about five feet below the surface. It was the normal soil in that vicinity, and you will recognize the similarity to that of your own. From the underdrain an open trap was discharging clear, cool, and sparkling water, which analysis showed to be equal to good spring water. Drinking-cups were provided, and could one dismiss from his mind the sewage from which it was derived, temperature, odor, color, and taste would place it in estimation far above the average town water-supply.

The surface was laid out in beds with rows of vegetation, between which shallow ditches, four or five inches deep, which might have been made with a plough, served to carry the sewage which, at regular intervals, was discharged into these channels. Garden vegetables, fruits, and flowers occupied the land, surrounded by espaliers of apples, peaches, grapes, and pears. It furnished a wonderful example of what may be accomplished under intensive culture by the use of sewage. Furthermore, it was absolutely inoffensive. The unsightly top-dressing with the coarse products of the barn-yard, on Commonwealth avenue, and the artificial fertilizers whose offensive odor I have often noticed, suffer by comparison with this modern method of fertilizing with fresh sewage in the fashionable quarter of Paris.

The Germans recognized, in 1872, the advantages of this method of disposing of sewage on the plain of Gennevilliers, and with a part of the indemnity received from France, began the construction of a similar system for Berlin, under the advice of Virchow

and other distinguished sanitarians. Today the farms receive all the sewage of the city, where all cesspools and privy vaults have been suppressed. Public workhouses and convalescent hospitals are established on the different farms, which net the city from one to two and a half per cent above cost of operation and interest on plant.

In England there are over two hundred cities and towns where the sewage is thus utilized.

In conclusion, were I a garden farmer, and cultivating available land, I would obtain permission to connect my pumping plant with a sewerage system, and take the necessary supply of water and manure from that source. Had I the authority, I would require all our public institutions to utilize their wastes, if suitable land could be obtained.

Not long ago I visited one surrounded by light soil, for which the superintendent was buying manure and emptying all the sewage in a swamp, thus not alone wasting the best-known fertilizer, but establishing paludal conditions which might at any time send all the inmates to the hospital.

At Deer Island, where there are a thousand or more idle hands, I would set them at work raising vegetables, fruits, and flowers on land irrigated with sewage from the North Metropolitan district which is soon to flow past their summer residence and discharge into Boston's harbor. I would feed them on asparagus, celery, lettuce, onions, and cabbages raised by the sweat of their brow. The surplus fruits might be employed to tickle the palates of the governing politicians, as a perquisite for their arduous duties, and the flowers to adorn the municipal banquet table. I am not romancing in drawing this picture, for I dined under similar conditions, but in a country where men of science hold the positions generally occupied by politicians in our great and glorious land.

At the close of his paper Dr. Barnes referred to the report of the proceedings at the Seventh International Medical Congress, held at London in 1891, and read the following extracts: "At the meetings of Section V. of this Congress, Dr. Alfred Carpenter presented a paper which had for its object to show that every locality has duties which it owes to the nation to which it belongs. It should maintain public health by preventing disease,

especially in the matter of disposal of sewage. He held that utilizing that material in the irrigation of farming land was the best possible method. While the cost of such a system may exceed the financial returns from the lands cultivated, and the locality has to pay the deficit, the increased production of crops tends to reduce the price, which is a national advantage. He believed that density of population need not involve high prices, if the excreta of that population be properly used in agriculture; that it is the duty of a nation to produce a sufficient amount of food for the people, so as to be independent of foreigners in the event of war; that the non-utilization of sewage leads to conditions which produce disease germs, and the multiplication of epidemics. He supports his arguments by the results obtained at Croydon, at a two-penny rate, and shows that for this small outlay there has been a diminished death-rate, illness correspondingly reduced, a fivefold increase of production of the land, giving healthful employment to many people in the open country, thus withdrawing them from the crowded towns, and a great production of meat and milk; thus to some extent ensuring the nation against the fear of famine if war should break out and supplies from abroad be stopped. He strongly protested against any measure being taken that shall destroy the agricultural value of sewage, as being opposed to national interests, and comparing the sewage of London with that of Croydon, showed that it would be a national advantage to utilize the sewage of London as that of Croydon is utilized, and that the nation would be recouped for the expenditure if the interest on the amount expended were guaranteed by the State."

The following propositions which were prepared by Dr. Carpenter were also presented:

"First, That the judicious application of sewage in close proximity to dwellings does not depreciate the health of the occupants of those dwellings.

"Second, That the judicious application of sewage to land will satisfactorily cleanse the effluent water fit to discharge into any rivulet or brook.

"Third, That vegetables from fields continuously irrigated by sewage are satisfactory food for man or beast, and that animals fed mainly on such vegetables are as healthy as are those fed on ordinary agricultural products.

"Fourth, That germs which spread infectious diseases are not capable of reproduction on properly cultivated sewage farms, the chemical and vital conditions being contrary to their further development.

"The author supported these propositions by reference to the experience gained during the past thirty-one years on the Beddington Sewage Farm, proofs being adduced mainly from observations made during the last ten years."

Dr. Barnes remarked that in the paper from which he had read additional evidence is presented of the beneficial results of sewage farming, and that in the discussion which followed Dr. C. R. Drysdale paid tribute to Dr. Carpenter's excellent work, characterizing him as the father of sewage farming, and, alluding to the success at Croydon, said that in consequence of a visit paid to that farm by experts from Paris and Berlin, both those places had adopted the system with the same measure of success. A resolution offered by Sir Henry Roscoe, to the effect "That in the opinion of this meeting the best yet known method of disposing of the sewage of towns is that of purification and utilization on the land," was unanimously carried. Four days ago his death was reported in the daily press. Historians will place his name among the benefactors of mankind.

Victor Hugo, in "Les Miserables," describing the sewerage system of Paris nearly thirty years ago, makes a vivid picture of our American systems at the present time, as follows:

"Paris throws twenty-five millions a year into the sea. And this without metaphor. How, and in what manner? Day and night. With what object? Without any object. With what thought? Without thinking. For what return? For nothing. By means of what organ? By means of its intestine. What is its intestine? Its sewer. . . . Science, after long experiment, now knows that the most fertilizing and most effective of manures is that of man. The Chinese, we must say it to our shame, knew it before us. No Chinese peasant, Eckeburg tells us, goes to the city without carrying back, at the two ends of his bamboo, two buckets full of what we call filth. Thanks to human fertilization, the earth in China is still as young as in the days of Abraham. Chinese wheat yields a hundred and twenty fold. There is no guano comparable in fertility to the detritus of a capital. A great city is the most powerful of stercoraries. To employ the city to

enrich the plains would be a sure success. If our gold is filth, on the other hand our filth is gold. What is done with this filth — gold? It is swept into the abyss. We fit our convoys of ships at great expense to gather up at the South Pole the droppings of petrels and penguins, and the incalculable elements of wealth which we have under our own hands we send to the sea. All the human and animal manure which the world loses, restored to the land instead of being thrown into the water, would suffice to nourish the world.

"These heaps of garbage at the corners of the stone blocks; these tumbrils of mire jolting through the streets at night; these horrid scavengers' carts; these fetid streams of subterranean slime which the pavement hides from you — do you know what all this is? It is the flowering meadow, it is the green grass. It is marjoram and thyme and sage; it is game, it is cattle, it is the satisfied low of huge oxen at evening, it is perfumed hay, it is golden corn, it is bread on your table, it is warm blood in your veins, it is health, it is joy, it is life.

"Statistics show that France alone makes a liquidation of a hundred millions every year into the Atlantic ocean from the mouths of her rivers. . . . The cleverness of man is such that he prefers to throw this hundred millions into the gutter. It is the very substance of the people which is carried away, here drop by drop, there in floods, by the wretched vomiting of our sewers into the rivers, and the gigantic collection of our rivers into the ocean. Each hiccough of our cloaca costs us one thousand francs. From this follows two results: the land impoverished and the water infected. Hunger rising from the furrow, and disease rising from the river.

"A system of elementary drainage, as simple as the lungs of a man, and which is already in full operation in several villages in England, would suffice to bring into our cities the pure water of the fields, and send back into our fields the rich water of the cities, and this easy see-saw, the simplest in the world, would retain in our possession 'the hundred millions thrown away.'

"The present system does harm in endeavoring to do good. The intention is laudable, the result lamentable."

Before the discussion was opened, Dr. Barnes displayed a small plan, showing a section of the city of Paris, with the suburbs of

Clichy and Neuilly-sur-Seine, and extending beyond Clichy, to embrace the district of Gennevilliers, with the sewage farms there established; also extending beyond Neuilly to include the forest of St. Germain, the farthest section of which is also converted into an immense sewage farm, owned or carried on by the city of Paris. Another plan showed similar grounds located upon an incline, where the sewage was delivered upon alternate banks. Still another plan showed the city of Birmingham, England, with its series of sewage farms, which extend eastward a long distance on the northerly side of the Midland railway. A large chart gave the Birmingham farms on a much enlarged scale showing more details, all which illustrations were valuable additions to the lecture.

Discussion.

Leverett M. Chase said that he was much interested in the subject of the paper read today. It is one of the most important questions of public interest, and is daily becoming more so. He is a member of a Committee of the Massachusetts Horticultural Society for the investigation of methods of sewage disposal. He was convinced that the system of sewage irrigation, described by the lecturer, is the best way yet presented, and was decidedly in favor of having this foul, unwholesome matter used in producing excellent vegetables, luscious fruits, and beautiful flowers.

Col. Henry W. Wilson said that the subject of the paper had occupied his attention professionally, at intervals for thirty-five years. The difficulty in the treatment of the sewerage problem is the danger of creating a local nuisance, prejudicial to health, and the expense of obviating it. To avoid the outlay, half-way measures are often resorted to, which in time are discarded, and thus large sums of money are uselessly thrown away. Sometimes expensive schemes are thrust upon a community either from a lack of correct information or the desire of interested parties to promote a large undertaking with its profitable contracts. The popular notion with regard to sewage is that if it can be got into the sea it is the most harmless, and therefore the most satisfactory disposition of it. In reality, however, as soon as this material is poured into the salt water, a reaction occurs between the elements in solution and the soda contained in the salt, and chemical precipitation takes place, whereby an offensive and highly putres-

cible deposit is made immediately about the outlet, which the action of the tide and waves ultimately throws back upon the shore, creating a local nuisance of a bad type. It has been said that in the arrangement of the adjuncts of a Portuguese house the privy is placed on the street beside the front door. When the city of Boston shall have its outlets of the Metropolitan Sewerage System, one for the north side at Deer Island, and the other for the south side, by an extension of its present system from Moon Island to Long Island head, it will afford a capital illustration of this arrangement, with the equivalent of a privy on either hand of its front door. The beaches and shores of the tidal basins of the lower harbor will, before many years, be rendered very noxious from the filthy deposits which are being made today, and which will be largely increased when the works now being executed are completed. The magnitude of the subject will be better understood when it is considered that more than 30,000,000 gallons are now pumped daily into Quincy Bay, and that this large volume will soon be balanced by an equal amount which will be discharged at Deer Island when the great sewerage system is completed. Filth has been defined as dirt out of place. The drainage of a large city produces an immense amount of this misplaced material; the problem is how to dispose of it.

This subject is too broad to be discussed properly in an hour. The best authorities concur today that ocean beaches which are populated, or tidal basins, are not the proper places for sewage disposal, until everything that chemical reaction of the salt will precipitate has been removed from it. Chemical precipitation is now compulsory in many of the interior cities of this country and Europe. In all of these instances the valuable elements contained in the sewage are thrown away. From economical considerations it has seemed to many thoughtful people that these elements should be returned to the soil, and that by this means a nuisance will be prevented, and whatever is of value will be saved. The learned Professor Liebig many years ago computed from an analysis and estimate of the quantity of food consumed in London, that the annual waste by the city sewerage was more than £2,000,000 sterling, and that the wealth of the nation was being thrown into the sea. Calculations of this sort lead one into error, from the fact that it is assumed that the animal waste contains all of the elements of food, and no allowance is made for the larger

portion that is consumed in supporting life and enabling the individuals to perform their daily labors. As well might we expect to find the ashes in the pit to contain the valuable elements of the fuel consumed in the furnace, after they have been expended in producing heat or, its equivalent, work. At first it was readily assumed that by the resources of chemistry, these valuable elements, which were supposed to remain in the sewage, could be profitably extracted in the form of a portable fertilizer — a native guano, as it was called. This proved to be illusive, but the experience cost the promoter more than a million dollars. The conclusion has been finally forced upon those having to deal with these matters that, where it is practicable, the only safe and satisfactory method to dispose of this refuse is by irrigation. The paper read today is a thoughtful and rational presentation of this subject; it shows us what has been accomplished under favorable circumstances. For more than a hundred years a portion of the sewage of Edinburgh has been thus utilized upon the Cragittiny meadows. At Gennevilliers one-half — perhaps two-thirds — of the sewage of Paris is used in irrigating the market gardens there, the material being delivered to the gardeners free. Here the land is a level plain, and the soil being a light, sandy loam, and the climate mild, the conditions are the most favorable that they can be. Thirty years ago it was pointed out to the commissioners in charge of the sewerage of London that the most feasible plan of sewage disposal was to convey it in conduits to what is known as the Maplin sands, at the north of the mouth of the Thames, and there use it for irrigation; whether the irrigation proved successful or not, the water of the river would have been preserved in comparative purity. The commissioners decided to pour the concentrated volume into the river just below the city, that of the north side at Barking Creek, and that of the south side at Crossness, nearly opposite. The worst predictions of the result have been fulfilled. The water of the Thames at the city of London is about one-half as salt as the sea, and as soon as the sewage is discharged therein chemical precipitation occurs. The Thames is a tidal river in which the ebb tide runs out ten miles, and the flood sets back seven miles in every tide, so that matter in suspension in the water will proceed toward the sea six miles in twenty-four hours; this affords ample time for the waters to be completely polluted, so that fish are destroyed, and

persons who unhappily fall into the river are speedily suffocated; the channels and shores are becoming choked with enormous deposits of the offensive sediment precipitated, and London is clamorous today for something that will ameliorate these evils, which seem intolerable. What will be done no man can now predict, but some remedy must be found. This question of sewage disposal must be settled upon general principles, with due regard for the laws of nature, into which considerations of expense must and will enter.

Benjamin P. Ware thought we might assume that the plan of sewage irrigation is the best from the sanitary point of view, but that the expense it involves is a bar to its adoption. The Boston system was very costly to begin with, and is carried on at great expense. He asked Colonel Wilson if he thought it would have been much more expensive if the city had sent it into the country.

Colonel Wilson replied that the only increased expense would be the cost of the additional length of conduit to carry the sewage to the place of deposit, and the pumping necessary to give the increased head to deliver it at the greater distance. The city sewers are all below the street level, and in order to deliver the contents in the country, they must be pumped sufficiently high to give it the head to flow upon the higher ground. In a great many instances sewage is treated chemically and the nitrogenous material is precipitated by the use of cheap alkalies. Salt water contains an inexhaustible supply of alkali, ready for this very purpose. In every ton of sea-water there is approximately one hundred pounds of soda, which readily combines with the elements in the sewage and forms a precipitate. In the case of the Boston sewage, now poured into Quincy Bay, it amounts to four or five tons of putrescible matter in twenty-four hours. Much of this matter is brought to the shore by the action of the tide and waves, there to decompose and pollute the air with its offensive gases.

The great obstacles in the way of the adoption of wise and efficient methods of accomplishing desirable results in the treatment and disposal of sewage, arise partly from a popular faith in traditions, which are often baseless, and from a misunderstanding, or rather a non-understanding, of the natural laws which control these matters. There is no more skill or intelligence in public officials than there is in the average citizen, and rarely as much

honesty. All sorts of outrageous things have been proposed by public boards of commissioners and trustees, the accomplishment of which has only been prevented by the active opposition of citizens. It has been proved, clearly and incontestibly, that soil — not gravel or sand or earth, so called, but vegetable mould — is the only substance that will extract all of the putrescible elements from sewage and render it pure and innoxious. The only place where it has been undertaken on a large scale, amounting to thousands of acres, is at Gennevilliers, where it was at first regarded with suspicion, but has slowly gained in confidence. About Boston the only level tracts of unoccupied land are the broad expanses of salt marsh, but they are hardly suitable in their present condition, and it is one of the great subjects for investigation in this direction whether, by suitable diking, they may be rendered so dry as to be adapted for sewage disposal.

Another difficulty arises from observed facts that seem to be inconsistent with natural laws, or at least with our preconceived notions. For instance, a farmer was experimenting to learn the benefit of using liquid manure on a given area of land. Incidentally he watered a similar piece of land, having the same crops, with pure water, and obtained better results than from the liquid manure. This might naturally follow if the composition of the liquid manure was not adapted to the soil on which it was used, but it would be apt to confound many people.

In reply to another question, Colonel Wilson said that the sewage of Boston could undoubtedly have been carried just as far into the interior of the country, for the same expense that it cost to discharge it into the harbor at Moon head; the appliances in both cases would be similar, but it would be difficult to find any place within the same or a reasonable distance of the city where any considerable portion of the sewage could be utilized, and certainly there is no place where the surplus, over and above what would be used, could be allowed to run to waste. If a sufficient area could be found, say three or four thousand acres, of good loamy soil, where these waters might be utilized in irrigation, then this system might be adopted and become a permanent method of treatment, with the great advantage of a decided gain in sanitary conditions and the absence of a great offence produced by the present arrangements, which threaten to vex the inhabitants of the city as they have the dwellers on the shores of Quincy Bay.

Rev. Calvin Terry considered this one of the vital subjects of the age. It concerns every city, town, village, and hamlet in the land. It seemed to him that our civilization had hardly dawned in this respect. Many persons appear to think that if a dead dog, cat, fowl, or other offensive thing is thrown into the water, whether it be the ocean, a pond, river, or brook, it is finally disposed of, and if people below think such objects pollute the water they let them fish them out and bury them. He was tired of having to perform that office. Our rivers are already polluted beyond endurance. The Merrimac river valley has typhoid fever established — proved to be caused by the polluted water. Hartford formerly took some of its water supply from the Connecticut river, but the increased foulness of that large stream has obliged the city to discontinue such use of its waters. It is not pleasant to think what an immense volume of her filth Boston is pouring out into the bay, and thus providing a perpetual nuisance before each and all the shore towns, and eventually for herself. Indeed, the city must now be a sufferer, since the crop of clams, lobsters, and some fish that come into her markets must be more or less affected by this deposit upon their feeding-ground. This matter of effectually disposing of sewage should, and must, soon become a prominent public question; one to be considered, not merely nor chiefly from the financial, but rather from the sanitary, point of view. The value of sewage in agriculture has not yet been fully computed. The speaker had tried it upon a little patch of land which was producing nothing of any account, and it caused grass to grow so dense and rank that it could hardly be mowed. He said, Try it on a rod of ground and you will be astonished at the results. It is well worth using for other crops. Sandy land is plenty on Cape Cod, and in the whole Cape district. Thousands of acres, which now produce only scrub pines and oaks, could be made to produce heavy crops of grass, and its value would be increased from ten dollars an acre to hundreds. In a matter of such importance as this, the expense of carrying sewage there should not be considered, even if there were no profit in it, for the sanitary consideration should be held to be of the first importance.

Hon. James J. H. Gregory spoke of the Danvers Insane Asylum as having seven hundred inmates; and that its sewage was said to amount to four hundred thousand gallons per day.

He described the soil as being a good loam, and asked whether such land could be profitably treated with sewage without being underdrained.

Dr. Barnes replied that not so much sewage could be used on such a soil as on sandy land, but it could be used up to the point of waterlogging. He cited the case of Croydon, England, whose sewage-irrigated farms could take but little over one-third as much as the land of Gennevilliers, France.

Mr. Gregory thought that sewage would not be wholly wasted, even if it ran through watercourses to the sea. Sea plants might be nourished by it, and these serve as food for fish, or be used by the farmers as plant food.

Dr. Barnes rejoined that, as a rule, sea plants and clams are killed by sewage. Still, if it could be given them in just the right amount, it might induce a more vigorous growth. Rockweed makes a very slow growth near the shore, but a much more vigorous growth is found in deep water, far out from the shore.

Mr. Chase remarked that his committee had been giving attention to the subject referred to them. They had visited the Bridgewater Normal School and found that the experimental use of dry earth in closets had proved successful, apparently. This system is not new, being known even in the time of Moses, as is related in the Scriptures. On a moderate scale this is an economical method to prevent a nuisance. Speaking of the expense of the Boston sewerage system he said the tunnel to Moon Island was a very expensive part of the work. As to finding suitable sandy soil in the vicinity of Boston to be used in sewage-farming, he said there are very large areas north of Boston, and also at the south, near Quincy. The matter of effectually disposing of filth is of great importance. People do not realize the strength of the gases exhaled by such substances. Not long ago he learned that the color of a newly painted house at City Point was changed to a dirty brown in a short time by the gaseous emanations from decomposing matter being blown against it. If it could do this, what effect must it have upon the health of the inmates of that house, who must have breathed it? It has been shown that constantly dwelling in a city causes a people to decrease in stature, and also in vital power; which latter is probably the cause of the former change. He had seen persons busy in gathering grease from the surface of the Thames, near London, and had observed a black

scum floating near the shores as one goes down the harbor past Moon Island.

William C. Strong asked if Colonel Wilson could tell him whether Boston sewage has been correctly analyzed.

Colonel Wilson replied that the sewage of Boston is very much like that of all great cities and is quite uniform in its analysis, phosphoric acid and nitrogen being about the only elements of value — about three pounds of the former and thirty-five pounds of the latter in five hundred tons, which would give a manurial value of about one cent per ton if the nitrogen were developed into the form of a nitrate, which is not the case, however.

An allusion being made to the use of sewage in Holland and China for the purposes of agriculture, Colonel Wilson said that it must be remembered that in both of these countries labor is very cheap and economies are practised there which are not dreamed of with us, neither would they be tolerated. In the former country it is common for people to contract and save the chamber slops of the house for the sum of ten cents per year, and it is collected by women from house to house. Similar conditions exist in China. Do any of us desire to see the population of this country in so depressed, not to say degraded, a condition, socially and industrially, that such a condition of things will or can be possible? Do we desire to witness men and women, with pole on shoulder and bucket at each end, passing through our streets collecting this material. Some will say that more improved methods will be contrived; when they are, then it will be time enough to consider them, but every contrivance and suggestion hitherto made has failed; our people can obtain a more generous living and find more profitable employment, and our social condition will not allow of such customs.

In answer to a question whether sewage might not nourish marine plants and thus be not entirely wasted, Colonel Wilson said that it was barely possible that the growth of some forms of marine plants might be promoted or benefited by the application of sewage, but it had been observed that, in harbors and bays, sewage killed all forms of sea-weeds and algæ, so that the presence of sea-weed was considered as an indication that the waters were not polluted by sewage.

A remark being made as to the feasibility of taking the sewage of Boston to the sandy plains of Cape Cod, Colonel Wilson said

that the nearest lands suitable for such purposes are eighty miles distant from the city. No area less than three thousand acres would be adequate and there must be more for necessary enlargement; but it would cost from four and one-half to five cents per ton to take it there, and it would be worth only one cent per ton when used for the fertilizing elements it contained. There is no question that under certain conditions sewage farming can be carried on profitably, and there are other conditions where it would be good policy to carry it on at a loss, which would be offset by the great benefit to the community from the purification of noxious matter and the prevention of a nuisance. In most cases it becomes the problem of the purification of a thickly settled locality rather than the fertilization of so many acres of land.

The city of Brighton, England, formerly discharged its sewage into the ocean directly on the shore; before long it was found that the death-rate exceeded that of the city of London, and it was directly traceable to the pollution of the shore; the conduits were then extended nearly a thousand feet from the shore, into deep water which was never less than eighteen feet at low tide; still the offensive deposits were cast ashore by the waves and the evil was not materially diminished; the sewers were then extended down the coast about five miles at an expense of $500,000 to a spot which was uninhabited, where the chalk cliffs rise abruptly from the water, and there it now remains.

Dr. Barnes said that the discussion had drifted somewhat. His endeavor had been to make his lecture practical, by showing to those who could get sewage that they would not only get a fertilizer, but water; that in the culture of any land, irrigation and drainage being at command, production is in great measure under the control of the cultivator. By irrigation with fresh sewage, one accumulates fertilizer, and has all the water desired. When well managed, there is very little if any offensive gas arising; but if there is some, its being in free atmosphere may prevent any injurious effect, although disagreeable to a certain degree. The sewage delivered at Gennevilliers is diluted about the same as Boston sewage. The authorities of Paris claim that the more it is diluted the more easily it is transported. Dantzic, like Edinburgh, has in its suburbs large areas of sand which, by irrigation with fresh sewage from that city, have become so productive as to pay an annual rental of from twenty to one hundred dollars per

acre to the owner. Precisely similar lands at Edinburgh now pay rentals of from one hundred and twenty-five dollars to one hundred and fifty dollars per acre. The speaker assumed that farmers having light sandy soil would readily take town sewage if they could get it for nothing. The most of our public institutions have broad areas of land. The State almshouse at Tewksbury has upon its grounds considerable sandy land. Some time ago the sewage accumulated so rapidly that, as the usual methods of disposal were inadequate, it became very offensive. Dr. Barnes advised putting it into that sandy soil, which was done. The result was, that not only was the nuisance effectually abated, but the productiveness of the land was much increased. He had noticed a faint odor of sewage, when it was first applied on a surface, but that was limited to a radius of a few feet and continued for but a little while, and it could be used on Commonwealth avenue with far less offence than the present top-dressing of stable manure. As an illustration of the ready assimilation of sewage fertilization, he stated that on land so treated Italian rye-grass has been known to grow two inches in twenty-four hours.

Colonel Wilson again spoke of the able and instructive lecture given by Dr. Barnes, and moved a vote of thanks to him, which was unanimously carried.

The President announced that the subject of the lecture on the next Saturday would be "Road Making and Maintenance," by Henry Irwin, A.B., C.E., of the Canadian Pacific Railway, Montreal, Canada.

BUSINESS MEETING.

SATURDAY, February 6, 1892.

An adjourned meeting of the Society was holden at eleven o'clock, the President, WILLIAM H. SPOONER, in the chair.

The following-named persons were proposed for membership:

Joseph Whitney, of Cambridgeport, by Leverett M. Chase.

Arthur W. Young, of Hingham, by Starkes Whiton, as a Life Member.

Kenneth Finlayson, of Brookline, by James H. Wheeler, as an Annual Member.

The following-named persons, having been recommended by the Executive Committee for membership in the Society were, on ballot, duly elected:

WILLIAM PATTERSON, of Quincy,
LOUVILLE CURTIS, of Tyngsborough,
RUFUS T. TOBEY, of Roxbury.

Adjourned to Saturday, February 13.

MEETING FOR DISCUSSION.

ROAD MAKING AND MAINTENANCE.

By HENRY IRWIN, B.A., C.E., Canadian Pacific Railway, Montreal, Canada.

This lecture was provided by the Bay State Agricultural Society in connection with the Massachusetts Horticultural Society.

The subject of the paper which I have been asked to read before you today is one which immediately concerns almost every one in the State, for, though there are many people who very seldom travel by rail, there are very few who do not make use of public roads at least two or three times a week, and some walk or drive over them almost every day. Yet, while the facilities and accommodations offered by the railways in this country cannot be surpassed, if indeed they can be equalled, in Europe, the public roads are, as a rule, very inferior to those of the older countries of Europe.

This, however, is what might be expected, for without railways it would be absolutely impossible to transport produce over such a large extent of country to its market, or to the seaboard for export; while on poor roads it is generally possible to draw, in dry weather, half what might be drawn on good roads.

Another circumstance that has doubtless helped to hinder the development of public highways is the size of the farms, which are, as a rule, much larger than those in Europe; so that each farmer has a much greater length of road to pay for.

It must also be remembered that new settlers are often so poor as to be unable to pay a heavy tax, and that this country has developed so rapidly that the road mileage must be very large in proportion to the population.

Before dealing with the question of construction it would

appear well to give some figures to show the loss which bad roads entail and the advantages to be derived from first making them properly and afterwards keeping them in good order.

It would be of little use to lay before you any information based on the conditions which obtain in the Province of Quebec, where the roads, except close to the larger towns, are as bad as they well can be; because in that province the snow in winter is always counted on to provide the farmers with easy means of bringing their produce into market during about three months in the year.

It may be remarked, however, that, for some time after the autumn rains have set in, and also before the frost has gone out of the ground sufficiently to permit of farming operations being carried on to any great extent, the farmer's horses are practically useless, since the roads at those periods are almost impassable, while at the same time no ploughing can be done.

The writer has seen a road on the Island of Montreal so bad that it was almost impossible to walk on it, during a wet season, and a horse was scarcely able to drag an empty cart along it.

The writer also remembers well that, at his home in Ireland, during wet weather in winter, the eight farm horses were sent into market with produce and brought out a load of manure each, the usual load being from eighteen hundred to two thousand pounds for each horse, and the distance to the market being about seven and a half miles, over a road with some pretty steep hills. Had the roads not been kept in good order these eight horses would have been idle during many a wet day.

With regard to the economical features of good roads in this State the writer cannot give the results of any experience of his own, but must quote from various articles which he has lately read on the subject, relating to roads in various States.

In November, 1891, the following appeared in the "Birmingham Age:"

"The best of it is, wherever these roads [alluding to the macadamized roads] lead out from Birmingham the cotton patch is disappearing and diversified farming is taking its place. That is, a more profitable system of agriculture comes in with better roads."

In relation to this quotation the writer believes that if a proper system of mixed farming, with a liberal use of manure, had been always carried out in the Eastern States, there would have been no impoverished or abandoned farms about which one hears so

much of late, and farmers would be much better off and better able to construct good roads.

In January, 1891, Mr. Ira O. Baker, Professor of Civil Engineering in Illinois University, read a paper on "The Cost of Bad Roads" before the Illinois Society of Civil Engineers and Surveyors. Mr. Baker went very thoroughly into the subject, and an abstract from his paper will clearly show the necessity of keeping highways in good order.

He estimated that the average cost of drawing a load into market was a dollar and twenty-five cents, or twenty-five cents per mile, the average load for a team being about one ton (about the same load one horse used to draw at home on a good road), the average cost thus being twenty-five cents per ton mile.

He also assumed that a grade of one in twenty-five doubles the resistance. Allowing, however, that three-quarters of a ton could be taken up a long grade of one in twenty-five, on a road with such a grade the cost of hauling would be twenty-five cents for three-quarters of a ton, or thirty-three and a third cents per ton mile; that is, the grade adds eight and a third cents per ton mile, and as the average length of haul was found to be five miles, the extra cost of the grade is forty-one and two-thirds cents per load. In the case of a town into which there were drawn an average of three thousand loads per year over roads within a half a mile of the town, the cost of this grade would be $1,250 per year. This, at seven per cent, represents a capital of $17,860; which amount might be expended on improving the roads and yet leave the tax-payer really no poorer. The estimated cost of twenty-five cents per ton mile included driving, feed, and wear and tear of horses, harness, and wagon. The capital of $17,860 above alluded to would pay for making from three to five miles of Telford-macadam road with a width of sixteen feet macadamized, according to distance from quarries, rate of wages, completeness of work, and nature of competition among contractors.

With regard to money saved by keeping roads in good order Mr. Baker instanced the case of a town into which 14,000 wagon loads were brought per annum. Had the roads been in good condition this grain could have been taken in with only 10,500 loads, the load on good roads being taken as one-third more than that on the existing roads. The total loads saved would thus be 3,500, which at sixty-five cents per load would give an

annual saving of $2,275. This amount capitalized at seven per cent would yield $32,500, which might be borrowed and spent on improving the roads.

Mr. F. Hodgman, of Climax, Mich., at the annual meeting of the Michigan Engineering Society held in January, 1891, read a paper of which the following is an abstract:

"There are about seventy-two miles of road in the township of Climax. On one road a farmer once drew a load of 142 bushels of wheat with two horses. This would be about 9,000 pounds including the wagon. Allowing that each horse exerted a pull of 125 pounds during the trip, this would correspond to a tractive force of one thirty-sixth of the load, or the amount which would be required, according to Morin, on a good, level, macadam road which was not moist or dusty, so that the load was not excessive. On the same road eighty bushels can be hauled all the year round on an average. Throughout the whole township only thirty bushels can be hauled. Supposing it to be forty bushels, half the time spent in hauling is wasted. There are about 5,000 loads of produce taken to market in the township during the year, of which 2,500 loads might be dispensed with on good roads. Assuming the cost per load to be $3 it will be seen that $7,500 per year is wasted on bad roads."

This amount, the writer would add, if capitalized at six per cent, would bring $125,000, or $1,736 per mile of the roads in the township. If to this were added the capitalized loss per annum due to excess of cost of attempting to repair bad roads above the amount necessary to keep in order those which have been properly made at first, and if there were also added the loss to others than those who have to take produce to market, a sufficient sum might be realized to put all the roads in the township in good condition.

It should also be noted here that the *direct* loss to the farmer, through not being able to draw full loads into market, is not all that should be considered. The *time* which could be saved might be spent in putting in more crops, or in improving the farm in various ways, which would directly increase the revenue, and yield a profit on the labor thus saved from being wasted on the road to market.

The writer wishes to give another example of the cost of bad roads, as published in the "Engineering News," Feb. 7, 1891.

In January, 1891, a committee of the Engineer's Society of Western Pennsylvania reported on the "Improvement of County Roads." A part of their report is given as follows, viz.:

"In discussing the cost of handling the agricultural products of the State the committee figures that about 3,250,000 tons must be hauled an average distance of five miles to reach a market, or steam conveyance to market. Two loads per day are assured, and $2.50 per day is taken as the cost of a two-horse team. The cost of moving this tonnage over 'clay' and 'macadam' roads would contrast as follows:

	Clay road.	Macadam.
Load for two horses	1,400 lbs.	2,180 lbs.
Number of loads for 3,250,000 tons .	4,643,000	2,981,000
Cost at $1.25 per load . . .	$5,703.750	$3,726,250
Difference	$1,977,500	

"The nearly $2,000,000 thus annually wasted is enough to keep in repair 30,000 miles of turnpike at an annual expenditure of $66 per mile. Taken as day's work for a man and two horses, we have 2,321,000 on clay roads, and 1,490,000 on macadam; a loss of 831,000 days' labor, that could be devoted to other useful purposes."

In "A Move for Better Roads," published by a Pennsylvania Committee on Better Roads, a writer, whose name is not given, states that "In those portions of Ohio which have taken advantage of the statute, an increase of fifty per cent in value is not uncommon, and twenty-five per cent is the least estimate resulting from the improvements. Moreover, the people of those sections would not be deprived of their good roads at any price. Nor would they consent to go back to the old system of mud roads. They pay their tax cheerfully, and without any longing for the annual picnic, commonly called 'working the roads.' Any enterprise which reduces the cost of transportation forty per cent, and increases the value of land from twenty-five to fifty per cent, should commend itself to the self-interest of every farmer in the State."

The writer remembers to have seen a statement a few years ago, published in a newspaper in one of the Southern States, to the effect that, in a section of the State where the hay crop had been a failure, the roads were so bad that it would have cost

more than the hay was worth to cart it into the section, and that, in consequence, cattle were dying from starvation.

These roads must have been about as bad as the "tote roads" made from the shores of Lake Superior to a railway under construction, where hay sometimes cost as much as eighty dollars per ton, and where a contractor told the writer that sometimes the horses would eat almost their entire load on their journey.

But apart altogether from the direct loss arising from bad roads, or the direct profit to be made by keeping them in good order, the great inconvenience and discomfort caused by mud and dust should not be overlooked. Many people who would prefer to live in the country are forced to remain in town, and the use of bicycles, now so common in England, is prohibited as a practical means of going to business cheaply and expeditiously, and thus, for want of means of transport, land in the country remains cheap, while town lots are excessively dear; and since none but farmers live in the country, there are no consumers to whom they can sell except in the towns, whither all produce must be hauled, no matter what the cost may be.

Having pointed out some instances of the loss the community suffer through bad roads, wherever they may exist, and some of the advantages which may be derived from making them properly and maintaining them in good order, it remains to show how they may be thus made and maintained. Before doing so the writer would state that it is impossible to lay down hard and fast rules to cover all conditions that may arise.

In building roads, as in all other engineering works, a good deal must be left to the judgment of the engineer in charge. There are often two ways of doing a particular work, either of which may turn out as well as the other; but when any plan of operations has been decided on, the engineer in charge should be allowed to have it carried out thoroughly and honestly, and no officials, whether of State, county, town, or township, should be permitted to interfere between the engineer and the contractor, so long as the former adheres to the terms of the contract for the work in hand.

The proper making and maintenance of roads requires careful attention to details which appear petty and irksome to many, and, even after the best has been done, the engineer gets more blame than praise, as a rule, since the perfect road has not yet been made.

The first point to be considered in making a road is its location. As the roads in the older States are, as a rule, already laid out and open for traffic, there does not seem to be any necessity for dealing with this subject except under the head of change of location. This would seldom be required, except to avoid a hill when the expense of cutting it down would be too great.

There can be no question but that hills should be avoided by going round them instead of crossing over them. It takes a very considerable détour to add twenty-five per cent to the length of a road between two points, say four miles apart in a straight line. An extra mile in length, so long as it does not reduce the number of trips per day which can be made to market, is not nearly so great a disadvantage as a few steep hills which reduce the load at each trip by one-third or one-half.

But admitting that hills should be avoided as far as possible, it will seldom happen that a practically level road can be obtained. The maximum grade to be permitted on any road has therefore to be decided on.

It is generally admitted that the average cart horse can exert a pull of from one hundred and twenty to one hundred and twenty-five pounds during a working day at the rate of about two and one-half miles per hour. One hundred and twenty pounds at a rate of two and one-half miles per hour is equal to 26,400 foot pounds per minute. One hundred and twenty-five pounds at a rate of three miles per hour is equal to 33,000 foot pounds per minute, or what is called "one-horse power." It is also usually assumed that a horse can double his average rate of working for a short time, at intervals during the day, but that he cannot be counted on to do much more without overtaxing his strength. Admitting this assumption, it is evident that no hills should be allowed on a road steeper than would double the average tractive force required on the level. Now the extra pull required on a hill varies directly as its steepness, and the tractive force required on the level varies according to the firmness and smoothness of its surface.

Mr. Morin's celebrated experiments as to the power required to draw loaded vehicles on various kinds of roads give the following results as to the relation between the load and the force necessary to haul trucks with two-ton loads; viz.:

Description of Road.	Tractive force divided by total load.
Earth road covered with gravel	$\frac{1}{11}$
Very good earth road	$\frac{1}{29}$
Macadam road with deep ruts and thick mud . .	$\frac{1}{14}$
Macadam with ruts and mud	$\frac{1}{24}$
Macadam moist or dusty	$\frac{1}{38}$
Macadam very dry and smooth	$\frac{1}{54}$

The conditions last quoted are very seldom attained to except for a short time during the year. Mud cannot always be removed as fast as it accumulates, ruts require to be filled in with new macadam, and ridges require to be removed. These and similar causes always increase the average tractive power required, so that, even on well-kept roads, it is probable that a force of about one-thirtieth of the entire load will be required to haul four-wheel trucks with a load, including the truck, of about two tons. Now a grade of one in thirty will also increase the necessary force by one-thirtieth, therefore, assuming that horses are not to be forced to exert more than double their pull required on the level, a grade of one in thirty is the greatest that should be allowed on a good macadamized road.

Where the roads are not kept in very good order, grades as steep as one in twenty might be allowed. Such grades, however, should not be long — not over about three hundred feet if possible. In the case of all long hills it would be well to divide them up by having a level piece of road about one hundred feet long, say in every three hundred feet, as a steady pull up hill is very tiring to a horse.

In no case should a steeper grade than one in twelve be allowed, and that should not be more than about one hundred feet long. In making farm bridges over the railway with which the writer is connected, if they are not more than about one hundred feet long the grade is usually one in ten, but when it is much longer the grade is usually reduced to one in twelve; but it must be remembered that these bridges are planked, and that the tractive force required on them is about one-fiftieth, due to the surface, and about one-tenth, due to the grade, or about six-fiftieths of the load altogether. Supposing the total load to be two tons or four thousand pounds for two horses; each would have to exert a pull

of two hundred and forty pounds, or about double the average force which a horse can exert daily. It should be remembered, however, that in hauling a load up a steep hill, there is another item to be taken into account which is often omitted; viz., the loss of power apparently due to want of weight on the horse to enable him to grip the ground securely with his feet. The writer has no doubt you have all noticed that a driver will often sit on the end of the shaft of a one-horse cart, and thereby help the horse considerably in going up hill. In addition to the loss from this cause, there is a further loss, due to the pull not being exerted in the best direction in going up hill. From the strained position of the horse his pull is generally directed lower than parallel to the hill, instead of higher, so that the tendency is to force the wheels into obstacles instead of lifting them over.

The following table, based on the experiments by Morin already referred to, on the assumption that the average tractive force exerted by a horse is one hundred and twenty pounds, and that the resistance on grades up to one in twenty varies directly as the grade; but that a further deduction of five per cent should be made in the case of grades of about one in twelve, will serve to show the necessity for keeping grades down as low as possible.

Estimated loads which can be drawn by one horse on various kinds of roads, both on the level and on the grades specified:

Description of Road.	Tractive force on Level.	Loads in Pounds.			
		Grades.			
		Level.	1 in 30.	1 in 20.	1 in 12.
Dry pavement	$\frac{1}{65}$	7,800	2,460	1,836	1,152
Muddy pavement	$\frac{1}{50}$	6,000	2,256	1,716	1,106
Macadamized roads, very dry and smooth	$\frac{1}{54}$	6,480	2,316	1,752	1,117
Macadamized roads, moist or dusty	$\frac{1}{38}$	4,560	2,016	1,572	1,037
" " with ruts and mud	$\frac{1}{24}$	2,880	1,600	1,308	912
" " with deep ruts and thick mud	$\frac{1}{14}$	1,680	1,140	984	741
Earth road in very good order	$\frac{1}{20}$	3,480	1,800	1,416	969
Earth road with 1½ inches of gravel	$\frac{1}{11}$	1,320	960	840	650
Stone trackways, from MacNeil	$\frac{1}{179}$	21,480	3,084	2,160	1,288

From this table it will be seen that in the case of an earth road in very good condition, only about one-half of the load that can be hauled on the level can be taken up a grade of one in thirty,

with the same exertion, while little more than one-quarter could be drawn up a grade of one in twelve under the same conditions.

While the disadvantage of grades is thus clearly shown, it is not well to have a road perfectly flat, for, since the water tables, or small drains at the edges of the roadway, must, according to old French and English authorities, have a fall of at least one in one hundred and twenty, they would soon sink too much below the general surface of the road, were it perfectly level. Another reason why a perfectly level road should be avoided is, that when the road is slightly rutted, water will lie in the ruts unless it can flow off longitudinally to the end of the rut, whence it can escape to the side of the road. The writer is of opinion, however, that this minimum grade of one in one hundred and twenty is seldom adhered to, and that a minimum grade of one in two hundred is ample to provide for the longitudinal drainage.

The location and grades of a road having been decided on, the next point to be settled is the drainage. This is one of the most important items in construction, for unless the pavement or macadam be laid on a dry foundation, or unless a strong concrete foundation or some similar expensive method be resorted to, it will invariably work down, and the mud below will work up to the surface.

Were all road-beds properly drained they would never be heaved up when frost thaws out in the spring, nor would macadam be so often seen sinking under the traffic and mixing with mud from below into a shifting mass with apparently no bottom.

As a rule, except in towns or villages, roads should have an open ditch from three to four feet deep on each side, except in the case of deep cuttings, where the extra width required for open ditches would entail too much expense.

These side-ditches should be outside the fences, to obviate the danger of driving into them at night. They might be one foot wide at the bottom, unless a considerable stream has to be provided for, in which case it would be necessary to calculate the required width. The sides in good ground will generally stand at one and a quarter to one.

In addition to these side-ditches, covered drains under the road are often necessary:

First. When there are springs or patches of swampy ground under the road-bed, and

Second. When the ground is of a clayey or very compact nature, so that the side-ditches will not drain the whole of the soil under the road-bed.

In the first case a French drain should be made from the wet spot directly to the side-ditch.

In the second case a French drain may be made along the centre of the road-bed with outlets into the open ditches at suitable places; or V-shaped drains may be laid starting from the centre of the road and leading to the ditches.

The best system to be used can only be determined after the examination of the ground.

When the soil is open and gravelly the open side-ditches are sufficient, as they will act from twenty-five to thirty feet on each side.

In the case of a marly loam, drains will act about twelve or fifteen feet on each side; while in the case of stiff clay they will only drain about eight or nine feet on each side.

French drains may be from three to four feet deep, six or eight inches wide at the bottom, and eighteen to twenty inches wide at the top. They are sometimes made with stones from two inches to six inches in diameter, the smaller stones being laid on the top, the depth of the stones being from fifteen to eighteen inches. It is much better, however, to lay pipes of unglazed earthenware from three to six inches in diameter at the bottom, covered with stones from two to four inches in diameter, to a height of about eighteen inches from the bottom of the drain. The stones should be covered with a layer of small brushwood, coarse straw, corn stalks, or sods, in order that the soil when filled in again may not fall in between the stones.

When flat bedded stones, which will split up easily into straight pieces, can be obtained, they may be used instead of tiles, by putting in a row of stones vertically along the sides of the trench and covering them with other flat stones.

In deep cuttings, or through villages, French drains should be put in on each side instead of open ditches. In a paper read at the Sixth Annual Meeting of the Illinois Society of Engineers and Surveyors, Mr. T. S. McChanahan recommended laying tile-drains on each side of a road instead of macadamizing it, on the ground of their cheapness. The district referred to was not closely populated, and it would seem that open ditches would be much

cheaper, could be more easily inspected, and would not be in danger of being clogged up with the roots of the trees along the roadside, and in addition, numerous connections would have to be made from the water-tables to the tile-drains at the sides to carry off the surface water.

However, where there is danger of the water in the side-ditches being polluted with drainage from houses, it would be better to substitute covered drains.

In the case of cuttings over four or five feet deep, where the original ground surface is level, or slopes towards the road, catch-water drains should be made along the top of the bank to keep the surface water from flowing over the banks on the roadside. Such drains should be about five feet back from the edge of the cut, and should have a good fall, to prevent the water from lodging in them and soaking through to the face of the cutting.

As great a fall as possible should be given to drains, and the bottom should be brought to a uniform grade by the use of "boning rods," three being used, about four inches wide, and four feet long, with a cross-piece at the upper end about twelve or fifteen inches long, set square on the part which is held vertically.

In a newly made drain, water will flow freely on a grade of one in two thousand four hundred or one-half inch per hundred feet; but after a time, when grass and weeds begin to grow in the bottom, the flow will not be nearly so good, and for this reason it would be well to give all open drains a fall of not less than two inches per hundred feet, or one in six hundred.

Culverts to carry water across the road should be made, if possible, either of stone or glazed earthenware pipes.

In all cases they should be made larger than would be required to carry off the greatest estimated amount of water that might have to pass through them; they should be set low enough to allow for the clearing out of contributing ditches, but not so low as to let the water lie in them. They should have a good fall — say of one in two hundred to one in one hundred and twenty — so as to discharge the water coming to them rapidly, and prevent material brought down by the water from being deposited in them.

Stone culverts not more than about two feet six inches square might be made without mortar, provided that there will be no great run of water through them, in which case they should be built with cement or hydraulic lime mortar, to prevent the water from

washing away the earth under or behind the stone work. It is advisable that such culverts should be not less that two feet by one foot six inches to allow a boy to pass through them to clear them out.

The stones on the top should have a bearing of about six inches on the side walls, and should not be less than nine inches thick over a two-foot culvert, and one foot thick over a three-foot culvert, as heavy rollers or extra heavy loads of machinery have to be provided for.

The walls of the culverts should be about two feet thick and not bonded in any way into the pavement of the waterway. The ends of the pavement should have stones about two feet deep, set vertically across the full width to keep water from working under the pavement.

Where they can be procured, glazed earthenware tile pipes will generally be found much cheaper than stone, as they require much less labor to lay them.

The writer recently examined eighty culverts of imported glazed tile pipes, twelve inches in diameter and one inch thick, on one of the Canadian Pacific railway lines near Montreal.

These culverts were put in during the year 1886; sixteen were under the railway track, and sixty-five under farm-crossings. Several of the latter had only three feet of earth over them. Only one, which had about eighteen inches of earth over it, was broken in and choked up, and thirteen end pipes were cracked or partly broken; eleven of these were under farm-crossings. None had failed in the centre. The ends were not protected by either masonry or wooden covers as they should have been; or all but the one which had too little earth over it would have been perfectly sound. The following table, copied from "Engineering," Nov. 20, 1891, shows the strength of vitrified drain-pipes, as found by Mr. M. A. Howe.

Average diameter	4 in.	6 in.	8 in.	10 in.	12 in.
Average thickness	0.64 "	0.76 "	0.82 "	0.90 "	1.05 "
Concentrated load	4,100	2,700	2,400	2,200	2,700
Uniform load	17,300	12,000	5,900	4,600	5,000

The loads given are in pounds. The uniform load was applied on a sand cushion. Even with a load of fifteen tons, the pipes

did not collapse. When using these pipes, the following precautions should be adopted:

A hollow should be made in the bed of the trench to receive the faucet end of the pipe, so that the whole length of the pipe may lie evenly on the trench.

In using the larger-sized pipes, a small hollow should be cut out along the centre of the trench to give the body of the pipe a good bearing.

No stones should be allowed immediately under the pipe, and in back-filling some fine earth should be well rammed all round the pipe.

The ends should be protected with small masonry or wooden end-walls. Where at all possible, the top of the pipe should be three feet below the surface of the road, and on no account less than two feet.

The following are the "list prices" of pipes as furnished by the United States Fire Clay Company, of Cleveland, O.

Calibre.	Price per foot.	Bends and elbows, each.	Number of feet in car-load of 24,000 lbs.
9 in.	$0.55	$2.25	900
10 "	0.65	2.75	750
12 "	0.85	3.50	550
15 "	1.25	4.75	400
18 "	1.70	6.50	320
20 "	2.25	7.50	270
22 "	2.75	9.00	200
24 "	3.25	11.00	180

For double-strength culvert pipe, ten per cent less discount is allowed than for standard pipes. The thickness of those of fifteen inches diameter and over is one-twelfth of the diameter.

The following table gives further information as to culvert pipes:

Calibre.	Price per foot.	Weight per foot.	Thickness in inches.	Area in inches.	Feet in load of 26,000 lbs.
12 in.	$0.85	50 lbs.	$1\frac{1}{8}$ in.	113	600
15 "	1.25	74 "	$1\frac{3}{8}$ "	177	420
18 "	1.70	100 "	$1\frac{1}{2}$ "	254	290
20 "	2.25	125 "	$1\frac{5}{8}$ "	314	250
22 "	2.75	135 "	$1\frac{3}{4}$ "	345	240
24 "	3.25	185 "	2 "	455	180

The present discount is probably about forty per cent. As being closely allied to the question of drainage, it may be mentioned here that it would be advisable to have trees on only one side of a road, and that should be the northerly or the easterly side, in order that the sun and wind may dry the surface as much as possible.

Cuttings and embankments have next to be considered.

Ordinary earth or gravel will stand very well at a slope of one and a half horizontal to one vertical. Stiff clay requires a slope of about two to one. Very soft greasy clay will gradually slide out to a slope of three to one or even flatter unless the toe of the slope be held back by a small, dry wall.

Rock will stand in cutting at one-quarter to one; but when tipped loose into a bank will roll out to about one and one-half to one.

Cuttings or embankments not more than five feet high, of good earth, might be made with slopes of one to one if sown with grass and not liable to be washed with surface water.

Before making an embankment all trees, stumps, and small bushes should be cleared off, and clay should not be used to form the filling.

On sidelong ground the surface should be cut into steps, and care should be taken to cut off all drainage on the upper side, since the bank might slide down hill if it were saturated with water.

Where a road has to be made on clay, especially in the case of a bank, the stone might be laid on three-inch plank, placed across the road, which would prevent the stone from sinking into the clay while it is soft.

Where extra width of land cannot be obtained at a moderate cost, it will often be cheaper to build dry walls to hold back the banks on each side, and thus save not only in width of land required but in quantity of excavation or embankment.

In embankments on swampy land, drains will be required on each side to keep the foot of the bank dry.

It will often be found economical in the long run to sow the slopes of all banks with grass and clover seed, as a good sod keeps the frost and rain from cutting away the surface.

The next subject to be considered is the cross-section of the road.

Before discussing this, it would be well to adopt terms to distinguish between the full width of the road and the paved portion.

In what follows, therefore, the entire width of the land used for road purposes will be styled the "road-allowance;" the portion between the water tables and under the pavement will be called the "road-bed;" and the surface, whether paved or not, will be referred to as the "roadway."

Where there is no need for cutting or filling, the crown of the roadway should be raised at least a foot above the general surface of the ground with the material taken from the ditches, which should be sufficient for that purpose, as well as for raising the space set apart for the sidewalk; before this filling is done all vegetable matter should be removed from the surface, and none should be allowed in the filling.

The transverse slope of a well-kept macadamized road should be about one in thirty-six from the centre towards each side; in the case of a road which is not to be constantly looked after slopes of from one in twenty-five to one in twenty will be necessary. The slope for the last four or five feet should be made a little steeper than that of the central part. Where the roadway is over thirty feet wide, less slope than one in thirty-six would be sufficient. The practice in New York, according to Messrs. Herschell and North's "Book on Roads," seems to be to give a slope of about one in sixty for a forty-foot roadway, and one in eighty for an eighty-foot roadway; not counting in the depression of the water-tables.

Country roads, however, do not require to be made quite so flat as those in cities, since the traffic is more confined to the centre of the roadway. A transverse slope of about one in forty to one in fifty is sufficient for wooden or stone blocks, and about one in fifty for asphalt.

For a thirty-foot roadway in the country, a slope of from three to four inches for the first nine feet on each side of the centre, one and one-half inches to two inches for the next three feet, and the same amount for the next two feet, should keep the road surface quite dry if it be kept in fair condition.

With regard to the transverse slope on hills, very different opinions seem to be entertained. Some hold that, on account of the longitudinal slope, the transverse slope should be flatter than on the level; others maintain that it should be steeper, to prevent

the water from running along the road instead of across it. Certainly, unless a long grade is kept in very good order, and free from ruts, the surface water will tend to run down the centre of the road, and thereby loosen the macadam, and in such a case either the centre must be raised a little, or flat paved gutters made diagonally across the road at intervals to carry the water to the sides.

The next question to be settled is the width of the roadway.

When the road-allowance is of the usual width of sixty-six feet, the two side-ditches, with a berme of a foot on each side, will require at least eighteen feet; then, allowing two feet for the two fences, seven feet on each side for sidewalk spaces, and two feet for slope from sidewalk margin to water-table, there will remain thirty feet for roadway where there is no cutting or filling; that is, including the water-tables.

Where there is not much traffic it is well to reduce the width of roadway to about twenty to twenty-four feet, to have one sidewalk on the north or east side of the road, so that the sun and wind may dry it as much as possible, and to leave the extra width all on the opposite side, to be used for storing stone or for depositing road scrapings until they are taken away; and farmers would generally benefit themselves were they to take the scrapings for their farms, as they make first-rate top-dressing, either alone, when the macadam is made of limestone, or mixed with lime when the macadam is of trap or similar rock.

Having decided on the width of the road-bed, it should be formed with the same transverse slope as the future surface, the portion to be macadamized being excavated to the proper depth to receive it.

Where there is very little traffic, and it is desirable to spend as little money as possible, the central portion only might be stoned, for a width of eight feet, the whole roadway being left about twenty-two feet wide, so that vehicles may pass on each side of the central eight feet.

Where there is much traffic at the same time in both directions, the road-bed should be macadamized for the width of sixteen feet, which is about the least width necessary to allow two vehicles to pass easily without getting off the paved portion. From twenty-two to twenty-four feet is required to allow three vehicles to pass abreast.

In deciding on the width of the macadamized part, it should be remembered that the narrower it is the more it will cut into ruts, especially when it is only eight feet wide, so that it may turn out very false economy to reduce the width too much.

Having determined on the width of the portion to be macadamized, and having brought it to the proper grade and transverse slope, it should be well rolled, if possible, with a steam-roller not less than ten tons in weight. All places which sink below grade during rolling should be filled in and rolled again until the entire surface is well consolidated. In all cases the road-bed should be left a few inches higher than the finished grade, to allow for settlement under the roller.

The next question to discuss is the nature of the road surface, and the manner of laying it.

In large towns the cost of keeping macadamized roads in good order is so great, that it is fast putting them out of use, and no doubt, before long, where traffic is heavy, stone blocks, brick, wooden blocks, or asphalt will be exclusively used wherever capital can be raised to pay for them. In the case of side streets where the traffic is light, of streets in small towns, and of country roads, macadam, either with or without the Telford foundation, must be used very largely for many years to come.

Before discussing the question of macadamized roads, however, a few remarks might be made with regard to earth and gravel roads.

Where earth roads are a necessity, drainage is a most important point. The transverse slope of the surface should be about one in twenty-four, and the water-tables should be from ten to twelve inches below the level of the crown of the road. It should be remembered, however, that when the roadway gets badly cut up, no amount of transverse slope, or raising of the crown above the water-tables, will keep the surface dry. The material of which it is formed seems to get worked up into an impervious puddle, in the ruts of which the water will lie till it evaporates, and this is also true of gravel roads badly made. The writer saw a piece of road, a few weeks ago, on which the centre was at least two feet higher than the water-tables, yet this central part, only about ten feet wide, was a soft, wet mass of mud and gravel, full of water, while the water-tables were perfectly dry.

In repairing earth roads, no large stones should be used in

filling the ruts, neither should sods or vegetable matter of any sort be used for filling.

In this case, as in that of all kinds of roads, the material should be of a uniform nature. A little clay may be used to advantage on sandy roads, and sand, charcoal, broken bricks, or slag, would help to keep the clay roads from getting sticky in wet weather. It would appear, however, that money expended in trying to improve earth roads would be more profitably spent in gradually macadamizing them.

Continual use of a ten or fifteen ton roller would improve earth roads considerably.

In making gravel roads it would be well to screen the gravel, putting on a layer four or five inches thick, of the part which is over two and one-half inches in diameter first, and rolling it until it is well compacted, then another layer of the same thickness should be spread and rolled, and finally a third layer about two inches thick of the finest gravel, free of earth, may be laid and well rolled. Watering each layer will make it bind much better, but it must be remembered that round gravel cannot bind into a solid mass like good cubical macadam, as the tendency of the particles is to roll over each other under heavy traffic. Under light traffic, no doubt, a gravel road will answer very well, if carefully attended to, and if ruts are filled in as fast as they appear, so as to keep the surface dry, and also to prevent the lower layers from being driven down into the earth below.

Messrs. Herschell and North, in their prize essays on roads, describe some very good gravel roads in New York. These were made, however, on a Telford foundation, and with a great deal of care, so that it would appear that gravel was used rather to make a smooth surface for pleasure driving than for the sake of economy.

In discussing the question of roads coated with broken stone the first point to be taken up is that of the use of the Telford foundation. Opinion differs very much in regard to this. Mr. Herschell is very strong in his condemnation of the idea of using broken stone without a foundation to keep it from sinking into the ground. Mr. North also seems to be in favor of the Telford foundation, but many other writers think it unnecessary. The writer's opinion, elsewhere previously expressed, is, that except where a road is to be made on rock, hard pan, or very compact

gravel, the Telford foundation is necessary, and will be found as cheap in the long run as using broken stone alone. No doubt, on a good dry soil, where the traffic is not too heavy, a good road can be made without the foundation course, but in wet weather, under heavy traffic, the earth from below will almost invariably work up to the surface in the shape of mud.

The writer has seen, during the last fifteen years, a large number of macadamized streets, without a foundation course, opened up for pipe laying, and has noticed that, with but one exception, where a large quantity of quarry chippings had been placed under the macadam, the broken stone was mixed up with altogether too much earth, and these roads always got extremely muddy in wet weather. Unless the road-bed is exceedingly well rolled, and the broken stone so well compacted and so thick that its bond will not get broken up, the earth below will not prevent the small stones from sinking into it; and when this once begins, a yielding, muddy roadway is the result. In the county in Ireland where the writer had charge of the roads of a district, the Telford foundation was always used. And it should be remembered that the Telford system does not cost much more than the other, as a good road, of broken stone only, must be nearly as thick as that with a foundation course, which, when laid, costs about the same per cubic yard as broken stone; while the road with a Telford foundation will generally cost much less for the removal of mud, and will be more likely to have a firm, compact surface.

The Telford foundation should be laid by hand, with the larger surface of the stones downwards, and the larger crevices should be closed up with quarry chippings well wedged in. The whole surface should be well rammed to give all the stones a solid, uniform bearing on the road-bed. The smaller crevices between the stones will serve to carry down the water that may soak through the broken stone above. The wedging and ramming above referred to should not be carried out close enough to the end of the paving to displace the stones. Generally about fifteen feet would be near enough to come to the face. The stones for the pavement should be about five to eight inches wide and from eight to twelve inches long, seven or eight inches deep at the centre, and six or seven inches deep at the sides of the roadway, and laid with the length across the road. Where the pavement does not extend across the full width of the roadway so as to bear

against the curbing, it would be well to set the outside row of the foundation course on each side on edge, so as to keep the stones from getting spread out of place. This pavement, which has not to stand any wearing action of the wheels, need not be of such good stone as the macadam should be made of, but should be strong and not liable to split up under the pressure from the traffic.

For making the macadam a good, compact, fine-grained basalt or whinstone is probably the best, but a similar quality of syenite is very suitable. Granite is not so good, as the mica in it makes it liable to disintegrate. Quartz rock or flint is rather brittle and difficult to break up into proper shape, but it is very hard. Gneiss, slaty rocks, mica schist, and sandstone make very poor macadam. The harder kinds of limestone break easily into well-shaped fragments, but they wear away easily and make a very fine dust, which seems to be more or less burnt into quicklime under a hot sun and the grinding of wheels. The writer's opinion is that hand-broken stone is better than that crushed by a machine, since it is more cubical in shape and binds more easily into a solid mass, stone broken by machine being generally in rather thinner and longer pieces.

It would be impossible, however, in many places, to get enough stone broken by hand at a reasonable price. The cost of breaking stone by hand varies from 80 cents to $1.50 per yard, according to the hardness of the stone and the rate of wages. In getting stone broken by hand, however, it would be well to pay for it by the cubic yard.

Breaking stone with a machine will cost from about 35 cents to 75 cents per yard, including interest on the cost of the machine, and wear and tear.

The above prices do not include the royalty on the stone at the quarry, the quarrying, or the carting to the machine. The cost of quarrying and hauling would be from about 45 cents to 65 cents per yard.

In the district in which the writer had charge of the roads, the best stone-breaker could break up about a yard and three-quarters per day of two-inch macadam of hard basalt; the average being about a yard and a quarter. From $1 to $1.25 per yard should be a good price for breaking good hard basalt or syenite; and in the winter, when work is scarce, it should be done for 90 cents.

The broken stone should be laid in two layers, the lower to be well rolled before the upper is put on, as, if the full thickness be spread at once, the stones will not be so easily compacted, but will roll on each other, and get worn round before binding together.

The stones of the lower layer need not be finer than would pass through a two and one-half inch ring, and the layer should be about four inches thick, and a quarter of the stones might be three inches in diameter.

For the upper layer none of the stones should be larger than would pass through a two-inch ring, and none should be less than one inch in diameter in any direction, except in the case of soft stone, such as limestone, which should not be less than two inches in least diameter, nor larger than will pass through a two and one-half inch ring in any direction.

The upper layer, before being rolled, should be covered with a coat of clean screenings of broken stone, and well watered. It should then be rolled with a steam-roller from ten to fifteen tons in weight.

In deciding on the weight of a roller the weight per inch of face should be considered. A cart-wheel two inches wide will often carry a load of one thousand pounds, or five hundred pounds per inch of face; a roller, therefore, weighing from four hundred and fifty to five hundred pounds per inch of face will be more likely to consolidate the road-surface so that it will not sink under the traffic than one which will weigh only half as much, as would be the case with a horse-roller. Another disadvantage in horse-rollers is that the horses, in drawing a heavy load, will tear up the macadam with their feet.

Steam-rollers will cost about $5,000 or $6,000; taking the latter figure and ten per cent for interest and depreciation, there would be a fixed charge of $2 per working day; assuming the cost of running at $8 per day, the total cost for rolling would be $10 per day if used all the year round, which is much less than the cost per day of a horse-roller with enough horses to draw it without tearing up the macadam.

The older method of consolidating the surface under traffic, besides being very inconvenient, could not make the macadam bind together until after it had worked about so much that the angles got more or less rounded off, whereas a heavy roller, with its wide sur-

face, presses the stones into their place without working into and scattering them about.

When coarse screenings cannot be obtained for binding, very coarse, clean sand may be used; but soft, earthy material should never be substituted, as it will be washed down among the stones and prevent them from binding properly.

If broken stone of larger size than has been described above be used it will be impossible to get an even surface, and long stones are always liable to be tilted up and kicked out of the surface. The disadvantage of rough roads may be better understood from a statement of the fact that for a weight of one thousand pounds the additional force required, when the wheel is about to roll over a stone only two inches higher than the average level of the road, would be about four hundred and thirty-six pounds, or nearly four times the average pull of a horse.

Since wide tires will sink less than those that are narrow, in proportion to their width, it would be advisable to have as wide tires as possible, up to six inches.

Such tires are much less destructive to roads; they do not scatter freshly laid stones about, but help to consolidate the surface; and they get a better uniform bearing on the average surface, and do not crush the macadam, as their weight is distributed over a larger surface. Widths of tires should be regulated by law and should not be less than say:

3	inches wide	for loads of	1,000 lbs. to 1,500 lbs.	per wheel.
4	"	"	1,500 lbs. to 2,000 lbs.	"
5	"	"	2,000 lbs. to 2,500 lbs.	"
6	"	"	2,500 lbs. to 3,000 lbs.	"

or at the rate of at least one inch in width for each five hundred pounds, no wheel to be less than three inches wide for a vehicle without springs. When springs are used the tires might be an inch narrower, since the springs reduce the pounding action of the wheels, and also render the traction easier by reducing the shocks in passing over obstacles, and by giving more time to lift the weight over inequalities.

After a road has been completed and opened for traffic it should be well attended to. Should vehicles drive too much in any particular track, obstacles should be placed on it to divert them from it, loose stones should be gathered off and used to fill in any ruts that might be made, or stored along the side of the road for

future use, and all hollows which may be formed in weak places should be levelled up.

To keep a road in good order it should be attended to from time to time throughout the whole year.

When the traffic is very light one man for a day per week will keep a section of two or three miles in length in order, with the help of a man and team to draw stone when it is required. When the traffic is very heavy two men will often be required for full time all the year round, on a section from two to three miles long. In such a case it would generally be much cheaper to pave the road with brick if they can be got thoroughly well burnt. Two men, all the year round at one dollar and a half per day, will cost, say, nine hundred dollars per annum, which, if they have charge of three miles, would be three hundred dollars per mile; to this would have to be added, say, three hundred and sixty dollars per mile for three hundred tons of stone at one dollar and twenty cents per ton; making a total of six hundred and sixty dollars per mile. Supposing the roadway to be twenty-four feet wide, there would be fourteen thousand and eighty square yards per mile, so that the repairs alone would amount to twenty-one and one-third cents per square yard per annum. This would be about the interest on three dollars at seven per cent; and as good brick pavement, of two layers set on sand, can be laid for about one dollar and seventy-five cents per square yard, it would pay well to borrow money to lay brick pavement in place of macadam, the cost of keeping the former in repair being very small in comparison with cost of keeping macadam in order.

With regard to spreading fresh stone, the manner of doing so is generally quite different in towns from the custom on country roads.

In towns a complete coat of macadam is usually spread at once. This should be coated with nothing but clean, sharp, fine gravel or screenings from stone-breaking machines, then well watered and rolled.

Previous to laying the macadam in all cases the surface of the road should be picked up one stone deep, so that the new macadam may bind better into the old surface.

In country roads where only small patches of stone are required they should be spread in such a way that the traffic may gradually work over the edges of the patch, until it has been all consolidated.

If the wheels of vehicles be allowed to drive all over a small patch they will scatter the stones about so that they will not bind together.

No road scrapings should be put on for binding. If clean screenings or gravel cannot be obtained the patches will do better without anything, provided that they are not made too wide or too much in one line along the road. If mud be put on the patches the stones may keep together for a short time, but they will never bind properly, and will eventually work up into a soft mixture of mud and stones, and the most of the stones will ultimately be carted off with the road scrapings. Patches of stone may vary from ten feet to about sixty feet long, and from three to six feet wide, according to the width of the roadway. They should not be more than about three inches thick; a layer only as thick as the diameter of one stone will not have enough stone to bind together properly. If the patch be thicker it would require a roller to make it bind together. Patching should be done as far as possible during wet weather.

For cleaning the mud of roads in towns, revolving brushes drawn by horses are the cheapest; but if the surface be brushed too hard and clean, the stones are liable to be loosened. On country roads, where two men work together, scrapers mounted on wheels with a face about five feet wide, the face being divided into a number of sections about three inches wide, will get over much more surface than the ordinary scraper used by one man. When dust has to be swept off it could be more effectually removed if it were watered first. In removing either mud or dust it is well not to clean the surface too closely lest the surface stones should work loose for want of sufficient binding material. The stones below the surface layer can bind among themselves, since they are surrounded by others, but those of the top layer only wedge into those below them, and if the surface binding be removed they are liable to work loose. For this reason watering in dry weather is very useful.

Water-tables, and the outlets from them into the side-ditches, should be kept clean, especially during wet weather, and any hollows shown by water lying in them should be filled up.

The ditches and culverts should be cleaned out both in spring and fall, and the drainage generally should be carefully attended to.

The writer has seen it stated in one or two papers that a road

laid on a Telford foundation is more expensive to keep up than a simple macadam road; for the reason that the foundation is liable to be laid bare, or to work up through the macadam.

Now, in any place where the road-bed is so soft that the foundation would work loose, broken stone would sink out of sight in a very short time; and were a macadam road worn as much as a Telford-macadam road would require to be to lay bare the foundation, it would need as much broken stone to put it in order as would the road with the foundation.

When in England, lately, the writer saw some narrow roads paved with cobble-stones along the centre, apparently with the intention of preventing the horses' feet, always going in the same track, from tearing up the surface. The wheels being wide they did not have so much tendency to work the road into ruts. The writer also saw some streets in Manchester where tar, or probably a mixture of tar and pitch, was used to bind the stones on the surface, for which purpose it seemed to answer very well.

A few remarks may be added with regard to asphalt, block stone, brick, and wooden pavements.

These will all last better and give more satisfaction, and prove cheaper in the long run, when laid on a concrete foundation.

Asphalt and block stone should never be laid on anything else, as their first cost is high. Wood is sometimes laid on gravel or on tarred boards, but experience shows that it lasts longer and wears more evenly on concrete.

The writer has never seen any brick pavements made with hard paving bricks, burnt specially for the purpose, but from reports of various western engineering societies, from a periodical entitled "Paving and Municipal Engineering," published in Indianapolis, and from C. P. Chase's pamphlet on "Brick Pavement," it would appear that a hard-burnt brick, almost vitrified, makes a clean, durable roadway which is not so noisy as block stone, probably due to the fact that the bricks can be made with more uniform faces and squarer angles, so that they can be set much closer than stone blocks. Recent records seem to show that hard-burnt brick, made of suitable clay, containing very little iron so that it will not fuse easily, will last under heavy traffic from fifteen to eighteen years. The principal ad-

vantages of brick seem to be, less noise and jarring than with block stone, and much less cost; greater durability and less absorption of moisture than wooden blocks; and less cost and better foothold for horses than asphalt. If brick can be got which will last twenty years under moderately heavy traffic, it would seem to be advisable to lay it on a concrete foundation, the same as would be used for asphalt, stone blocks, or wood.

In Montreal a concrete foundation six inches deep, made of one part of Portland cement, three parts of sand, and four and a half of broken stone, has stood severe frost and heavy traffic for about four years without failure.

In laying stone blocks, a layer of sand about two inches deep is spread over the concrete, and on this the blocks, which are about four inches wide, six to seven inches deep, and eight to ten inches long, are laid lengthways across the street, and well rammed to an even surface, the joints being afterwards filled up with cement grout or hot pitch, and the surface covered with fine gravel, small enough to work in between the joints. While block stone lasts probably longer than any other kind of pavement it is very noisy and disagreeable to drive over.

Asphalt is sometimes laid in two courses, the lower, called the cushion course, containing more bitumen than the upper or wearing course.

The Val de Travers asphalt is laid in one course about two inches thick; it is broken up into powder, heated, spread over the concrete foundation, well rammed with hot iron rammers and rolled. A guarantee of from five to ten years should be required from the contractor, to prevent the possibility of bad material being used.

Asphalt should be kept well swept, for it is so smooth that the wind blows up the dust on it very readily.

The great advantages of asphalt are that it is very smooth, does not absorb moisture, is easily cleaned, and almost noiseless; its disadvantages are that it will not stand very heavy traffic and that it is very slippery after a frost or when slightly wet.

Wooden-block pavements are not so slippery as asphalt, nor so noisy as stone blocks, but they absorb the moisture on the surface, and do not wear so long as asphalt or stone, though they can be laid cheaper. Tamarack, yellow-pine, and cedar seem to last the best. The latter is generally used round, but it is very liable to

wear down round the edges, when it becomes as rough to drive over as cobble-stone.

Tamarack and yellow-pine are used square, about three inches wide, eight or nine inches long, and six inches deep. Tamarack is sometimes creosoted, apparently with good effect, but opinion seems divided on this point. The usual practice used to be to leave the joints between the blocks from about three-eighths of an inch to one inch wide, the joints being filled in with pitch. The blocks then wore down at the edges very quickly, making a rough road. When laid with much closer joints the blocks seem to wear better. The writer thinks that, if the blocks were coated round the sides with pitch and driven as close together as possible, they would wear still more evenly and last longer. A coating of clean, fine gravel is spread over the surface when finished. Defective blocks should be replaced at once and the surface well watered during dry weather.

Wooden blocks are sometimes laid on rolled gravel or macadam and a layer of sand, or on boards coated with tar; but there can be no doubt that a concrete foundation is by far the best, as, when well made, it is almost indestructible, and it could be used for laying brick or stone blocks afterwards.

Brick pavements are laid on a rolled gravel or broken stone foundation; on this a layer of sand from two to three inches deep is spread and, for one course, the bricks are set lengthways across the street, and well rammed to an even surface; sand enough to fill in between the joints is then spread on and swept in, and the surface is well rolled. When two courses of brick are used, the lower course is laid on its side instead of on its edge, and lengthways along the street; on this another layer of sand is spread and the upper course laid as before.

Bricks are also laid on tarred boards and sand, one layer above and one below the boards, the bricks being laid herring-bone fashion. They are also laid on concrete foundation, which will, no doubt, last longer in good condition than any other, and give a smoother road, but it is more expensive.

Bricks for paving which will stand as much compression per square inch as granite are now being made; suitable clay cannot, however, be got in all localities. There seems to be a great increase in the amount of brick pavement laid in some of the western States, and it appears to give satisfaction for cleanliness, durability, and cheapness.

DISCUSSION.

William C. Strong said that he was much interested in that science of road-making. The subject had been treated here today in a very interesting and instructive manner. He thought all were agreed, in theory at least, that to have the roads made in the best manner possible under existing circumstances is the truest economy. The subject has been considered in its practical bearings for purposes of travel. It would be out of place, at this late hour, to divert the thought to the æsthetic construction and care of our roads; but he would be glad, at some proper time, to have this side of the question considered.

J. D. W. French considered good roads a most important matter and that the "gospel of good roads" ought to be preached in every Farmers' Institute. While the highways have no special reference to the future life, they do exert a great influence upon the present. There is an especial need of good roads in the country, and if all our towns would make it a point to improve their thoroughfares, and then keep them in good condition, we should have fewer abandoned farms to report. Farmers are necessarily true economists in some things, but in others they are prodigals. He spoke of reading an article in which the direct tax of bad roads was estimated as fifteen dollars on every horse and mule in the country. In France, Italy, and Belgium the principal roads are maintained at the expense of the State, under the supervision of educated engineers. The great interest developed by the building of railroads has caused the people to forget, for the time being, the importance of the feeders. Were it not for the common roads, or highways, the railroads could not live. Farmers often complain that their products do not bring paying prices; but they sometimes overlook the fact that a dollar saved in producing their crops, or in the transportation, is as good as — if not better than — a dollar earned. If they can save ten or fifteen cents of cost of producing and carrying to market on a bushel of wheat, that becomes so much added to their profits. The wheat and corn grower calculates the expense of raising his crop, but often omits the cost of transporting it to market, and therein finds a considerable deficit of profit. The speaker believed that the principal roads — the main arteries of public travel between the towns — should be maintained at the

joint expense of the State, the county, and the towns, under the supervision of a State Engineer, who should be a man educated for the business.

Professor William Watson had listened with great pleasure to the interesting and valuable paper given today; it recalled many things he had observed in Europe respecting public works. In Holland, in driving from The Hague to the mouth of the Meuse, over a tract formed entirely of loose sand, the road was made wholly of brick placed edgewise, and he was surprised to find how pleasant and comfortable it was to ride over. Mr. French's idea of having State roads and county roads under the care of State and county officials was one which had worked very well in Europe and he would welcome its introduction here.

Francis H. Appleton remarked that we must bear in mind that in the older countries the population is large, and the territory omparatively small. The case is reversed here, and with so large a mileage of roads compared with population, it is difficult to make the roads thoroughly at first, or to keep them always in first-class repair. He was glad to hear Mr. French's idea; it would be a movement in the right direction, which in time might effect great improvement. Committees are now at work at the State House in this direction, and it is to be hoped that they may report recommendations looking toward an improved system of building and maintaining thoroughfares; and that those who are interested will appear before those committees to favor the plan.

Charles W. Mann said that European ideas in road-making are being taken up and applied in our own country; and that in the city of Elizabeth, N.J., where this has been done the effect was to increase the value of real estate to such a degree that the cost of the improvements was hardly felt.

Leverett M. Chase spoke of the width of tires as affecting roadways. While a six-inch tire with a two-ton load might easily pass over a road, a three-inch tire with a ten-ton load would prove destructive to an asphalt road as ordinarily made. Asphalt roads are very easy to ride upon, but there are objections to them. In summer, being black, they absorb heat, and are disagreeable to walk upon, and sometimes give off an unpleasant odor. He suggested that flat rails, twelve inches wide, could be laid down on a common road, thus providing for heavy traffic, except when two heavy loads met. Streets through which much

heavy freight passes should be well prepared for such use. As a good material for the surface of such streets or roads, he mentioned iron-slag. He had seen it where there was constant travel, and it stood well for seven years; it is a hard and tough material, well adapted for the purpose.

Mr. Irwin stated that in England, some towns regulate the width of tires, as recommended in his paper.

Mr. Appleton, who had been a member of the Massachusetts Legislature two years, said that a good thing generally succeeds if its merits are impressed on the minds of the people. But it often happens that a proposed measure, which if carried into effect would prove greatly beneficial, fails to be adopted merely because those best informed in regard to it neglect to appear before the Legislative Committee, at the advertised "hearing," to show the advantages it would secure, and urge its passage. He hoped individuals and organizations would be sure both to attend and to take part in the proceedings at every such hearing in which they are interested.

Mr. Chase claimed that no other city expends more money on its streets than Boston does; still, there is more or less neglect manifest the greater part of the time. A portion of Centre street is now in bad condition; it greatly needs to be gravelled and rolled. But where a large amount of travel and much heavy traffic are the rule, gravel in many places soon becomes mud, which is hard to cart away again.

O. B. Hadwen expressed a strong interest in the subject presented today. Cities, as a rule, take good care of their streets, but good roads are a great want almost everywhere in the country towns. While they are in fairly good repair a portion of the year, they are often bad, and even very bad, during the spring of the year. But with all the care a city can give to its streets, he finds it necessary to give some personal attention to the matter in his own district. Stones work up in the roadway, and get in the way of horses, carriages, and — boys. For this reason he goes around and picks up loose stones. Indeed, it becomes the duty of each individual to see that those little stones are picked up.

A vote of thanks to Mr. Irwin, for his valuable and interesting address, was unanimously passed.

The Chairman of the Committee on Publication and Discussion announced that on the next Saturday the subject of "Fungous Diseases of Plants, and their Remedies" would be presented by Prof. James Ellis Humphrey, S.B., Vegetable Physiologist to the Massachusetts Agricultural Experiment Station, Amherst.

BUSINESS MEETING.

SATURDAY, February 13, 1892.

An adjourned meeting of the Society was holden at eleven o'clock, the President, WILLIAM H. SPOONER, in the chair.

Charles N. Brackett moved that the resignation of Patrick Norton, as Chairman of the Committee of Arrangements, be taken from the table and referred to a committee of three, to be appointed by the Chair. The motion was carried, and the Chair appointed as that Committee, C. N. Brackett, E. W. Wood, and F. L. Harris.

Adjourned to Saturday, February 20.

MEETING FOR DISCUSSION.

The late John Lewis Russell, of Salem, Professor of Botany and Horticultural Physiology to the Society, by his will left a bequest of one thousand dollars to the Massachusetts Horticultural Society, "as a fund, the interest of which shall be paid annually to some competent person, who shall deliver a lecture on the latest discoveries of the connection of the fungi with horticulture."

The following lecture is the second of the series, for which the above mentioned bequest provides.

FUNGOUS DISEASES AND THEIR REMEDIES.

By Professor JAMES ELLIS HUMPHREY, S.B., Vegetable Physiologist to the Massachusetts Agricultural Experiment Station, Amherst.

The invitation of the Massachusetts Horticultural Society to deliver a lecture at one of its meetings is always esteemed an honor, but in my own case it is more than that. For I remember that the establishment of the department which I have had the honor to organize at the State Experiment Station was due in no small degree to the hearty interest and sup-

port of this Society. Therefore I must regard its call as not merely one for such information in the line of my own researches as I can give, but also as one for an account of my stewardship, which must not be disregarded. I am here, therefore, to realize the pleasure of an hour with you, and in recognition of your claim.

The subject on which I have been asked to speak to you, "Fungous Diseases of Plants and their Remedies," is so broad and embraces so much that I can hope merely to touch with more or less emphasis upon a few points. And the choice of those points is, by the very extent of the subject, devolved upon me.

In the first place, then, what do we mean by *fungous* diseases of plants? It is a mere evasion to say we mean disease caused by fungi. One form of expression is as good as the other, and the essential need of the inquirer concerning fungous diseases is a clear notion of what *fungi* are. Now, fortunately, this is not an impossible thing to acquire, although, unfortunately, such notions are today rarely possessed, even by well-informed, cultivated men and women, who take pride in keeping abreast with the world's progress. It is just this lack of definite ideas which is hampering and discouraging to the economic mycologist. Its replacement by an understanding of a few simple principles of fungous life would be a most wonderful gain both for those who can impart and for those who desire to receive practical information concerning the various fungous diseases which contribute so largely to the exemption of our farmers and gardeners from — what most of them would gladly risk — the curse of the rich man.

What is needed is missionary work, and there is surely no body of persons to whom one might more confidently appeal than the audience to which I speak. The appeal to you is for two things. First, will you not make a serious effort to get a definite idea of the relations of the *fungi* to other plants, and of a few characteristic features of their life? Second, having done this, will you not help to disseminate these ideas wherever opportunity presents itself in an interested listener?

The cloud of mystery which appears to befog the brain of even the most intelligent layman, when the term "fungus," or any of the organisms to which it is applied, is under discussion, is due, I think, to two causes. In the first place, the subject is a new one. It is not long since many of the fundamental facts concerning the fungi were new to botanists; and it is a much shorter

time since public attention was first called in this country to the practical application of these facts to the treatment of fungous diseases. It is not yet six years since the organization on a small scale of what has grown to be the extensive and well-equipped Division of Vegetable Pathology of the United States Department of Agriculture. Most of the work now in progress in the various experiment stations in many States has been begun since that time. Any new subject with new terms and unfamiliar conceptions seems at first strange and mysterious to the popular mind. But frequent reiteration makes the strangest things familiar and the most novel ideas natural. Twenty or twenty-five years ago the scientific discussion of fertilizers began in our State. Then the names of potash, nitrogen, and phosphoric acid were mere names, and conveyed as little definite meaning to the average hearer as do the terms, mycelium, resting spore, and summer spore, as applied to the fungi today. But now the man who uses fertilizers, and cannot discuss intelligently their essential constituents, so far as relates to his needs, is an "old fogy" indeed. So it will be with the fungi. But why need we wait twenty years for such a desirable consummation? Five years should be as good as twenty for its attainment.

In the second place, the general haziness of ideas about the fungi is due to a fundamental lack in our educational system. If long and bitter experience is beginning at last to bear fruit in the realization that the systems of the past are not all-sufficient for the needs of the present, it is still true that now, as formerly, the dominating idea in education is the literary idea. In the primary schools we have exercised our memories with facts and dates and details galore, all in the most abstract and indigestible form. We have learned to bound Beloochistan and to give the latitude and longitude of the Fiji Islands; but what of the geography of our own town, or of the meaning of hill and valley, of river and ocean and island, have we been taught to observe? We have learned of the desert and the jungle with their peculiar and wonderful vegetation; but what of the no less wonderful world in our dooryards, and beneath our very feet?

We are taught by implication, if not expressly, that there is nothing about us worth seeing, and therefore *we do not learn to see.*

In our secondary education the same tendencies and methods

confirm these results. If we are offered an occasional course of so-called natural science, it is not the study of nature, but of a text-book, and is too often illustrated only by unnatural specimens of the genus *Homo*, which serve as awful examples. But there are colleges and universities where the science of nature is studied at first hand, and given its rightful place as the educational equal of the dead languages without asking their leave or begging their pardon. And if, finally, in such a place, we begin to learn that the fascinations of that study are no less at home than elsewhere, we must learn at great pains, and perhaps never well, to use our faculty of observation, now almost atrophied from disuse during those precious years when it should have been developing.

But what of those to whom this revelation never comes? For them, always, the only nature worth observing is that which few of us ever see. Does any chance thrust before them some of the beautiful green Algæ which grow in almost every pool and ditch? They are gingerly thrust aside as "Nasty slime," or "Only frog-spittle." If some of the smaller fungi unavoidably invade the range of their narrow vision, "Nothing but a mould," or "Some kind of a growth," records the speaker's contempt for anything so unrecognized in polite society as a natural object. To how many does it occur to look for beauty in any of these things, or to ask, "What is its nature?" "Why does it grow here?" "How does it grow?" "Is it useful or harmful?"

It is just because so few think of asking these questions, and because so few see the little things about them, that the fungi seem such intangible and unreal things to so many. But they are not intangible, unreal, mysterious, and it will be my effort now to give you a distinct conception of what they are.

I shall try to give you, not a cold, formal, precise, scientific description, but a living and practically helpful idea. You have all seen — I hope you have all *noticed* — the clusters and masses composed of innumerable tiny green threads, which grow on grasses and sticks, or float on the surface, in brooks and ditches and ponds, especially in spring. If you never have noticed them, go to the nearest body of water next April and look at them. See what you can with the naked eye and any lens you may have, and then get your microscopical friend to give you a look at their real structure. It may be the beginning of a revelation to you of

a world of which you have not dreamed. You will see that these most delicate threads are strings of cells placed end to end, each with its living substance and its green pigment. You will probably see also among the threads tiny green objects of various shapes and perfect beauty, too small to be seen by the unaided eye. And a little comparison will show you that these correspond in all essential respects to a single cell of one of the threads; that they are, in other words, one-celled plants. These unicellular and filamentous plants represent the simplest forms of the great group of *Algæ*, whose highest members are found among the brown and red "rock-weeds" and "sea-mosses" of our shores. Now, an essential and important point in the life of these *Algæ* is that they possess and are colored by the green pigment we have noticed. It is easy to prove that this pigment is the same as that in the leaves of our flowering plants and ferns and mosses, and that, through its agency, all plants which contain it are able to provide themselves with organized food material by the combination, effected by this chlorophyll, of the necessary elements taken up in inorganic form, from the air and soil or water. This is a familiar subject and it is not necessary to dwell on the all-important part which chlorophyll plays in the economy of green plants. But you all know that some flowering plants are not green. You recall at once, of our home flora, the Indian Pipe and Pine-sap (*Monotropa*) of the Heath family; the Dodder (*Cuscuta*) of the Morning Glory family; the whole family of Broom Rapes (*Aphyllon*) and Beech Drops (*Epiphegus*), and the Coral-roots (*Corallorhiza*) of the Orchid family. All the evidence leads to the view that these plants are the descendants of green plants, like the other members of their families or of immediately related families, and that they have gradually lost their chlorophyll in the course of many successive generations. But why has it been lost? Doubtless because it has come to be no longer needed. We cannot doubt that these plants have gradually acquired the ability to obtain the organic substances which they require for their nourishment, ready prepared. In the case of the Indian Pipe, it is probable that these are obtained from the decaying substances contained in the vegetable mould in which it grows. The Broom Rape attaches itself to the roots of other plants and absorbs from them its food; and our Dodder twines its slender stems about the Golden-rod or some other coarse herb, and relentlessly sends its

root-like, absorbing organs into the living tissues of its victim, which, with fine irony, science terms its "host." These plants, then, have lost their independent life and have become *parasites*, or, if their nourishment be obtained from dead organisms, *saprophytes*. As these habits have become more and more completely fixed, and they have become able to live entirely at the expense of other organisms, the plants have lost their need of chlorophyll, and consequently it has ceased to be developed in their cells, in response to that economic principle of nature which provides for the disappearance of parts or structures when they are no longer of service to the organism. Leaves are chiefly organs for the elaboration of food material by the aid of chlorophyll; and in our parasitic and saprophytic plants they have in most cases been reduced to the merest rudiments by the action of this same law which makes usefulness the condition of continued existence. What a glorious riddance from cumberers of the ground would follow the application of such a law in human society!

Now, having seen what has happened in highly organized plants, is it difficult to conceive of the same thing as occurring to simple, green, filamentous Algæ? Not at all. It is easy to see that, just as the Dodder has become parasitic upon other flowering plants, so an alga may have become parasitic on another alga, or upon the leaf or stem or root of some flowering plant growing with it in the water, or on the margin of its brook or pool. From such a beginning upon aquatic and swamp plants, we can readily believe that the parasites would spread step by step to land plants; and we need only sufficient time to account for their general distribution.

Going back again to the Algæ, we can also readily see that some of them might easily become saprophytic by acquiring a habit of attaching themselves to decaying organisms in the water, dead leaves or stems of plants, dead frogs or insects, and similar objects. The habit once acquired, the transfer to all sorts of decaying substances on land would be easy. As the habits became fixed our Algæ would have lost their chlorophyll just as we have seen the Indian Pipe and Dodder have done, and for the same reason. They would then be no longer Algæ, but parasitic and saprophytic *Fungi*. There is much reason to believe that from such beginnings as I have suggested, have come the wonderfully varied and complex groups of Fungi which we know. Perhaps I

should add a word here, lest you think the distinction between parasitic and saprophytic forms of fundamental importance. It is not at all so, as is shown by the fact that in many cases, of two closely related fungi, one lives as a parasite and the other as a saprophyte. There are many cases of fungi which live parasitically at one stage of their life history and saprophytically at another; and some forms are known which can adopt either habit as circumstances dictate. But this difference of habit affords a convenient basis for our present discussion.

Let us glance for a moment at the saprophytic fungi. Among these are the common black and blue moulds which so readily attack cooked food, especially the sugary and starchy kinds. Then come those immense groups whose spore-producing, or reproductive, portion is so highly developed and conspicuous as to make them the most familiar of the group, the so-called Toadstools, Puff-balls, and Saucer-fungi. Closely related to the last may be named the Black Fungi, with a few parasitic species, notably those which produce the "Black Knot" of the plum, and the "Ergot" of rye.

But it is the parasitic forms which have the most practical interest. These include the Downy Mildews,* like those of spinach and lettuce; the Powdery Mildews, such as attack the cucumber and the rose under glass; and the Smuts, the Rusts, and scattered members of generally saprophytic groups. Besides these must be mentioned the hordes of so-called "Imperfect Fungi" which are chiefly parasitic forms or stages in the history of fungi whose final or perfect forms are saprophytic.

In spite of the amazing variety in their devices for propagation and dissemination and the wide differences in the structure of their reproductive parts, it is well worthy of remark that the vegetative or growing parts of all these fungi are almost exactly similar, and are in all cases delicate, simple threads, essentially like filamentous Algæ without chlorophyll. These constitute the *mycelium* of the fungus, and from them are produced the threads which bear the reproductive bodies or *spores*. For our present purpose we may best class these under two heads: those whose office is to secure the rapid propagation and spread of the fungus when conditions favor, which we may call "summer spores;" and those which can retain their vitality for a long time and preserve the species

* See Transactions of the Massachusetts Horticultural Society, 1889, Part 1, p. 40.

under unfavorable conditions, like those of winter or a dry season, which we call "resting spores."

It is, of course, the parasitic fungi which cause diseases of plants, and they are the ones, therefore, with which the economic mycologist has to deal. Before we inquire in what his dealings with them consist, let us see a little more definitely what we mean by a fungous disease. Perhaps you will accept with me the definition which regards as disease any deviation from the normal functional activity in any of the organs of an organism. Anything, then, which prevents the development of root-hairs and so checks the absorption of water; anything which kills the leaf cells and so stops the absorption of carbonic acid gas and the elaboration of food-material; anything which destroys or distorts the wood or bark, so as to cut off the upward flow of water or the downward passage of plastic material; or anything, finally, which attacks any part of flower or fruit so as to prevent the ripening of healthy seed or its subsequent germination, is a cause of disease. And if any of these disturbances be produced by a parasitic fungus, the result is a fungous disease. As a matter of fact fungous diseases of all the sorts I have mentioned are well known.

The roots of the cabbage and turnip are attacked by a tiny parasite much simpler than the true fungi, but admissible under that general head, which causes the disease known as "Club-root" or "Stump-foot." The fungus which causes the "Black Knot" of plum trees attacks the branches and even the trunk, and prevents the normal distribution of food material. The functions of leaves are interfered with by innumerable "Rusts" and "Leaf-blight" fungi of most varied sorts. And the seeds of our grains are utterly destroyed by "Smut" fungi. As coming under neither of these categories should be mentioned fungi of great practical importance which cause much loss to our fruit growers by destroying or rendering unsalable our fleshy fruits. They do not harm the seed and therefore cannot be said to interfere with the natural functions of the plant, except when they also attack leaves and twigs, as many of them do. We may instance those which cause the "Rot" of peaches and plums and the "Scab" of apples and pears.

Now, fungi, as we have seen, consist of a delicate vegetative mycelium from which arise the threads bearing spores. When a spore germinates, it produces, ultimately if not immediately, a

new mycelium, and this in turn gives rise to new spores. In this respect spores correspond to the seeds of the flowering plants. The mycelium of a parasitic fungus spreads itself over the surface of its host, or penetrates the tissues, making its way among or even through the cells. When the threads grow on the surface or between the cells, they commonly send into the cell-cavities short branches by which they absorb the living contents of the cells for their own nourishment. Thus the invaded tissues are killed and the parasite is furnished with material for growth into fresh territory, and for the development of its spores. By means of the spores fresh plants are attacked and so the fungus thrives and the disease spreads. A fungous disease is, then, a contagious disease. The killing of the living tissues whose life is the health of the plant must evidently result in its weakening, and often finally in its death. Now, in what does the study of fungous diseases consist, and what good can come from such study. Of course the ultimate practical object of the mycologist is to find a remedy for the disease, or, rather, a preventive of it, for, since the disease is due to the presence of another plant upon the diseased plant, we cannot expect, as a rule, to kill the parasite without killing the other, after it has fairly become established. But this finding a preventive involves more than at first appears. What did Pasteur do when he began the studies whose final aim was to find a cure for or a preventive of anthrax? What did Koch do when he undertook those studies, still far from completion, on tuberculosis? Think you they began by trying all the remedies of the pharmacopœia which might by chance have some mitigating effect? Such experiments would have been the wildest leaps in the dark. On the contrary, each of them began with the *cause* of the disease. He found it to be due to a parasitic organism, and he investigated that organism in all its details before he began to think of treatment. Only at the cost of much time and of infinite pains were the stories of their respective lives wrung from these tiny *Bacteria*, and the various conditions, favorable or unfavorable to their entrance and development in the animal body, determined. And when, finally, all these facts are known, the preventive and remedial treatments to which they point are such as a thousand years of blind guessing or experiment would never have hit upon. We may draw a similar instance from vegetable pathology. We know that treatment of seed oats for a short time with hot water

at about 135° will effectually prevent smut in the crop. But who would have been likely, in a century, to have guessed at such a simple device without the laborious researches of botanists to tell him the facts concerning the life history of the smut fungus, which have led to that result?

The work of the mycologist consists, then, in something more than dabbling in possible preventives and in trying this and that suggestion. That is the least part of his work, valuable as it is, and important as are the results which are yet to be reached in that field. But his real work is the study of the fungi themselves, of their structure and habits, the stories of their lives. How does it multiply? How does it spread? How does it attack and enter its host? How does it pass over seasons unfavorable for growth? What conditions favor and what check its development? These are questions which one must ask and answer as fully as possible before he can consider himself competent to try to solve the problem of prevention. But when these questions have been fully and rightly answered, the last problem often dwindles into the simple statement of an equation whose factors are all known quantities, and which bears its answer on its face. The problem of prevention becomes almost no problem at all.

It will, perhaps, be of interest to glance at the methods which the mycologist employs to enable him to acquire the necessary information concerning a given fungous disease. The trouble comes to his notice, let us say, accompanied by a fungus in a fully-developed, spore-bearing stage, since then its effects are most conspicuous. A careful microscopic study at this time will tell much of the structure and relationships of the fungus and of its relations to the diseased plant. From these facts and from the analogy of similar fungi some clews for further investigation may be obtained and some probabilities as to future results may be deduced. But one must be always on his guard against assuming too much. The next step is to obtain healthy plants of the sort affected, and to infect them with spores from the fungus which accompanies the disease. This infection must be carried on under conditions which shall, as far as possible, exclude all possibility of infection from other sources. If he finds that the fungus invariably accompanies the disease, and that infection of healthy plants with its spores produces that disease, he may safely conclude that it is the real cause of the trouble. There are many cases in which

some fungus commonly accompanies a diseased condition of which it is not the true cause.

Being convinced that a fungus stands in causal relation to the disease in hand, the investigator now proceeds to study the manner in which its spores germinate and how the young threads penetrate the host, and to follow, step by step, the phenomena which mark the various stages in the progress of the disease. He endeavors to discover how many and what spore-forms the fungus produces, what is the especial office of each, and whether each form is able to spread the disease by infecting new host-plants. He inquires whether the fungus may assume a saprophytic form and so bridge over the intervals between successive appearances of the parasitic stage. In the study of the developmental history of many fungi the greatest assistance is obtained from the use of artificial culture media. These are prepared for a given fungus by the addition of gelatine or a similar substance to some liquid containing suitable nutrient material for the growth of that fungus. Such material may be furnished by a decoction in water of some fruit or of the natural host-plant of the fungus. The addition of gelatine gives a solid medium on which the spores can be sown, and in which the mycelium can grow and send up the fruiting threads. It is necessary to make cultures with the greatest care to exclude all *Bacteria* and fungus-spores except those intentionally sown. This requires the complete sterilization of the nutritive media, and of all vessels and apparatus used, by means of high temperatures or antiseptic solutions. One must also take every precaution to have the spores which are sown pure and unmixed with other kinds. Only by these slow and laborious methods, by repeated failures and occasional successes, by appeal to all his resources, both natural and artificial, does the student of the fungi coax them to reveal to him, bit by bit, the histories of their lives and the conditions of their development. Very perplexing, and for a long time wholly baffling the skill of botanists, have been such parasites as those rusts which, although parasitic in all their stages, pass different parts of their lives upon different hosts, and produce characteristic spore-forms upon each. But now that we have the clew, and have in a number of cases definitely demonstrated the relations between the different forms, each year sees the uncertainty concerning a few more species cleared up, and steady progress made toward completer knowledge.

Another important question which often presents itself is whether a fungus may not attack several related hosts and thus, while we are trying to exterminate it upon one, be flourishing unobserved upon another, perhaps near by. In the cases of several fungous diseases of our cultivated plants some neighboring spontaneous plant may be an important aid in propagating the disease.

You will see how numerous and varied are the questions which arise in the investigation of a fungous disease, and how multifarious are the facts to be made out and studied in their bearings upon the question of treatment, which is the ultimate practical object of the investigation. And one of the first practical results of the widest applicability, which is deduced from what we already know of the fungi, is, as I have before said, the fact that treatment, to be efficient, must be *preventive* rather than remedial. It may be stated as a general principle, not wholly without exceptions, that a leaf, a fruit, a plant, once attacked is lost. Let us see, then, what can be done by way of preventing the attacks of fungi. It is a very trite saying that "An ounce of prevention is worth a pound of cure," but when cure is impossible, the value of prevention becomes infinitely increased. Of the first importance among preventives of disease must be mentioned healthful conditions. This seems like the statement of a very self-evident truth; yet much disease among cultivated plants is the result of disregard of this fundamental principle. A strong and vigorous plant, with abundant food at its disposal, will resist the attacks of fungi which would easily gain a footing on weaker ones; or will feed both itself and its parasite with comparatively little harm to itself.

But abundant nourishment is not the only condition of health. No practice is more common among our fruit growers than to leave in the vineyard and the orchard, lying on the ground or hanging from the branches, the dead fruits of the season, which have been rendered worthless by fungi. Nothing could produce more unhealthful conditions, for these dead fruits commonly furnish to the fungi which attack them precisely the most favorable soil for further and complete development. In the next spring the air is full of the spores of these fungi, which find lodgment on the new leaves and fruits of the very plants on which they grew last year; and so the story goes, year after year. In a word, keep your orchards and gardens and greenhouses *clean*. Allow no rubbish to be about, on which fungi can breed. Remove and destroy all

diseased fruits or plants as scrupulously as you preserve salable ones, and you will have more salable ones to preserve. It is surprising how far generous culture and clean culture will go toward preventing fungous diseases, without special treatment.

But in many cases the application of special protective preparations is of the greatest value, and is even necessary. It has often been the means of restoring to healthful growth and bearing plants which had become worthless and half dead from disease. Such a large proportion of parasitic fungi enter their hosts by way of the leaves or succulent stems that it is evident a great amount of loss can be avoided if we can find some substance which, when applied to the surfaces of tissues subject to attack, will, without injury to them, prevent the development of fungus-spores. Experimenters along this line early turned their attention to various compounds of copper, led by their well-known antiseptic and poisonous properties. And it has been found that various dilute preparations of the sulphate and carbonate of copper possess all the desirable qualities of harmlessness to the surface of the plant and ample *fungicidal* power. The names of the Bordeaux mixture and the ammoniacal carbonate of copper are familiar to you all. They are, as you know, applied in liquid form by means of a suitable force-pump and spraying-nozzle; and their protective action is easily understood. The liquid, reaching every part of the plant in the form of fine spray, soon dries by evaporation, leaving behind a delicate film of copper in the form of its hydrate, which adheres closely to the surface of the plant. Now, while the water-proof coating of all parts of the plant is unaffected by this film, it is sufficient to prevent the germination of any fungus spores which may fall upon it, and thus secures the plant against attack. Of course, the ordinary incidents of our changing weather gradually wear off this "copper-plating," and thus the plants become again exposed. It is therefore necessary to repeat the spraying every ten or fifteen days during the time that they are most liable to attack. This time, of course, varies with the habits of the different fungi. Let me emphasize again the essentially *preventive* nature of this treatment. After the plant is attacked no amount of spraying is of any service; and the whole secret of success with fungicides lies in their *thorough application early enough* and *often enough*.

The life histories of some fungi point to the probability, which is confirmed by experience, that less troublesome treatment than

that by spraying may check their development. For example, Powdery Mildews may be controlled in the greenhouse by the vapor of sulphur,* because their mycelium is not internal but superficial, and is killed by the sulphur, which does not injure the tough epidermis of the host.

Again, a fungus which enters plants in their youngest seedling-stage would plainly not be avoided by spraying. Such a one is the oat smut, of which the hot-water treatment of the seed, already mentioned, is an efficient preventive.

So one might run the gamut of variations in treatment, necessitated by the developmental differences in fungi. But such is not my present purpose. I have endeavored to give you, as I promised, a practical idea of what fungi are, and of the fundamental principles underlying the treatment of fungous diseases. I have not tried to give you specific prescriptions for particular diseases, because I realize that the interests represented in this audience are too varied to make it possible to select special cases which would be of interest to all.

It is the special province of my Department of the State Experiment Station to recommend treatment for diseases already understood, and to investigate such as are not sufficiently known. In the former line of work I am always glad to respond to all inquiries and requests for aid. In the latter, I wish earnestly to ask your aid. It is impossible for me to travel about the State, and I can only learn what diseases are causing loss, by their being brought to my attention by those who suffer. I ask especially the individual assistance which you can render by sending to the Experiment Station liberal specimens of any of your fruits or plants which are suffering from diseases that seem to be due to fungi.

The lecture was illustrated by a large variety of fungus-diseased specimens from the Station herbarium; also by other specimens, too large for such disposal, such as fragments of bark, sections of trunk or branch, etc. Among them was a dead fly attacked by an alga-like fungus. The attention of the large audience was closely held from the beginning to the close of the lecture.

* For method of application, see discussion which follows this paper.

DISCUSSION.

Benjamin P. Ware asked how sulphur vapor is produced and applied.

Professor Humphrey replied that it is produced by gradually heating sulphur, in an iron kettle, over an oil stove, to a point slightly above the melting point. This will throw off vapor, but great care must be taken that the heat does not much exceed that point, lest the sulphur be ignited, when sulphur *fumes* will fill the house and kill the plants.

E. W. Wood inquired what degree of success was attained in treating mildewed lettuce with sulphur vapor at the Agricultural Experiment Station.

Professor Humphrey said that it would not be satisfactory, for the reason that the mycelium of the *Downy* Mildews, which infest lettuce, is wholly within the plants, and is not reached by the vapors. But in cases where the *Powdery* Mildews are found, sulphur vapor is an effectual remedy, because the mycelium is external and fully exposed.

Joseph H. Woodford asked if hot water will prevent smut on a crop of oats, what degree of heat would be safe to apply to ordinary violets in beds?

Professor Humphrey replied that water at the temperature of 135° is necessary for seed-oats, which should be immersed fifteen minutes. This treatment will not only kill the spores of the smut, but it improves the germination of the oats. It would not be applicable to violets.

Robert Farquhar desired information as to the effect of hot water upon corn smut.

Professor Humphrey said that it is only a few years since it was found that the smut of corn develops very differently from that of oats; and therefore hot water treatment of corn is wholly ineffectual as a fungicide.

William C. Strong wished to know whether Bacteria are plants or animals.

Professor Humphrey said that Bacteria are very low forms of plants. They are unicellular; simpler than the thread-like fungi; are destitute of chlorophyll, and in a broad sense are fungi.

Rev. Calvin Terry asked if it were possible for persons to remain in a greenhouse where sulphur vapor was being generated? Is not breathing such an atmosphere injurious?

Professor Humphrey replied that while the sulphur is being heated, and the oil-flame being adjusted to keep the sulphur at a temperature just above the melting point, one can safely remain in the greenhouse by placing a wet handkerchief over both mouth and nose, which will allow the pure air to pass through it, but not admit the sulphur. Breathing the fumes of *burning* sulphur would be unhealthful.

Robert Farquhar asked if fungi like corn smut would produce death in animals that eat of it; and if so are there any remedies?

Professor Humphrey answered that these smuts, and particularly corn smut, if taken in considerable quantity, would cause death sometimes. Ergotism is an affection caused by ergot. Investigations of this part of the subject are now going on.

Rev. Charles S. Harrison wished to learn how it was that the entire crop on a large area — a hundred or a thousand acres — could all or nearly all be struck at once.

Professor Humphrey replied that this relates to a very interesting part of the work of mycologists. They are studying it at the West as well as at the East. The results of investigations have been published in the periodical "Agricultural Science," in which it was stated that the wide-spread destruction was due to the rapid development and distribution of the rust-spores during a few days of warm, moist weather, in which the leaves and stalks of the grain were filled with the fungous threads which appropriate the sap; consequently the grain is not filled out, and the crop is destroyed.

Professor Humphrey, in reply to the question, "Were all fungi derived from water plants?" said that away back in geologic time, doubtless fungi must have been evolved from water plants; but it would not do to assume this of all those plants at present. Grain rust differs from smut in regard to healthfulness. He did not think that rusted grain, if cut and dried, would injure cattle if fed to them. The rusts are destructive fungi, but not dangerous to animal life.

The question was asked: Does close planting promote the multiplication of parasitic fungi?

In reply Professor Humphrey said that crowded planting would be a cause of insufficient nutrition; of course you can give plenty of nutrition, but even then the plants would be more susceptible to injury from fungi, on account of insufficient light, and

the retention of rain and dew upon them, which would favor the development of fungi.

Professor Humphrey, being asked if he had ever tried pure oxygen as a remedy, said he had never done so, but both that and many other gases would be interesting to try, but impracticable to use on a large scale.

Mr. Strong made the inquiry whether the strawberry leaf rust is caused by a fungus or an insect.

Professor Humphrey replied that it is not a rust, but a leaf-spot fungus, The winter spores of the fungus are developed by the dead leaves and stems of the plants left on the strawberry patch over winter, and are ready to spread themselves and grow early in the spring. This is a case where clean culture is the best remedy for the fungous disease.

Mr. Strong said that his plants were affected at the last of the season, and he found it very difficult to spray them with Bordeaux mixture and lime; the nozzle quickly becomes clogged. He had found simple sulphate of copper effectual.

Professor Humphrey said that lime prevents injury from Bordeaux mixture if otherwise too strong; it also makes enough of the mixture stick to serve the purpose. The clogging is a serious difficulty, and partly for that reason Bordeaux mixture is going out of use, and ammoniacal carbonate of copper is being substituted for it, as simpler and better. Simple sulphur is not so effective as ammoniacal carbonate of copper, concerning which the testimony thus far is decidedly in its favor, as most effective. Where there is not too much ground to go over, knapsack spraying is convenient and generally satisfactory. Almost everything depends upon the nozzle, and it should throw a fine spray. To cleanse it, always remove it. The Vermorel nozzle is the best. It requires a good stout man to carry a knapsack sprayer of the usual size.

Benjamin P. Ware asked what is the great advantage of the *fine* spray? It is very difficult to apply Bordeaux mixture in a fine spray. He did not understand why a coarse spray is not as complete a protection, since it thoroughly covers the surface of the foliage.

Professor Humphrey answered, that in the first place a fine spray is more economical; next, it forms a thin film upon the surface, and dries much more quickly, which increases its durability,

as in case of a shower soon after its application it will not so readily wash off.

Mr. Ware thought that in a large orchard, especially of large trees, the extra time required to do the work with the fine spray would be a great objection.

William D. Philbrick spoke of Bordeaux mixture as objectionable when applied in fine spray on spinach, on account of the lime adhering to the leaves, and injuring their appearance.

Professor Humphrey said it is true that with a fine spray nozzle the mixture is not thrown so far, but when the foliage is close the fine spray permeates it better, instead of beating it down by drenching it. In case of large trees, a coarser spray may be permissible.

Mr. Ware had found it very difficult to pass the Bordeaux mixture through the very fine strainer which was furnished by the Agricultural Experiment Station, but it went through the coarser wire cloth easily. Thus strained there was no difficulty in satisfactorily forcing a spray through the adjustable nozzle, with the Douglas pump. The apparent waste of material was more than counterbalanced by the more expeditious straining through the coarser wire cloth.

Professor Humphrey said the difficulty appeared to be in the preparation of the mixture. The lime should be so thoroughly worked in as to make a fine mixture, and it is worth while to take time and pains to get it into that condition, because it is then so much more effectual.

Mr. Ware thought it important to get rid of lime altogether in any spraying compound. It has a strong tendency to discolor grapes, and might affect other fruits unfavorably, especially in regard to their sale.

Professor Humphrey said that lime must act chemically on copper, or must react, to form the hydrate of copper, just as ammonia does with carbonate of copper.

Rev. Mr. Harrison asked whether lime has any other value in spraying than to prevent injury to foliage by the Bordeaux mixture.

Professor Humphrey said he was not chemist enough to say whether lime is of any further use. Experiments have been made to find some alkaline substance of finer grain as a substitute. The tendency now is to discontinue the use of insoluble substances, and use only clear solutions.

On motion of O. B. Hadwen, a vote of thanks to Professor Humphrey for his instructive and valuable essay was unanimously passed.

Mr. Hadwen, as Chairman of the Committee on Discussion, announced for the next Saturday, "A Talk about the Preserving of Fruit," by Miss Maria Parloa, of Boston. This lecture was provided by the Bay State Agricultural Society, in connection with the Massachusetts Horticultural Society.

BUSINESS MEETING.

SATURDAY, February 20, 1892.

An adjourned meeting of the Society was holden at eleven o'clock, the President, WILLIAM H. SPOONER, in the chair.

Charles N. Brackett, Chairman of the Committee to which the resignation of Patrick Norton, as Chairman of the Committee of Arrangements, was referred at the last meeting, reported, recommending that Mr. Norton's resignation be accepted, and that the thanks of the Society be presented to him for his valuable services in that position. The report was unanimously accepted, and the thanks of the Society were presented to Mr. Norton.

The Secretary read a notice, received from Francis H. Appleton, of the Committee of the Legislature on the part of the House of Representatives, on so much of the Governor's Address as relates to the Department of Roads, Bridges, and Drainage, that that Committee would hold a meeting at the State House, on Tuesday, the 23d instant, at 10.30 o'clock, A.M.

The President announced the decease, on the 19th instant, of George W. Wilson, of Malden, for forty years a member of this Society, and an extensive and successful commercial cultivator of roses.

E. H. Hitchings moved that Edwin Faxon be added to the Committee on Large or Interesting Trees. The motion was unanimously carried.

Adjourned to Saturday, February 27.

MEETING FOR DISCUSSION.

The President announced that this lecture was provided by the Bay State Agricultural Society, in connection with the Massachusetts Horticultural Society; and he took great pleasure in welcoming the members of the Bay State Agricultural Society on this occasion.

A Talk about the Preserving of Fruit.*

By Miss Maria Parloa, Teacher of Cooking, Boston.

There are two ways said Miss Parloa of interpreting the word "preserving," as applied to fruit, the general understanding among housekeepers being that the fruit is cooked with a generous amount of sugar, the product being a rich compound of good keeping quality. In its broadest sense "preserving," when applied to food, means to save from decay by drying, canning, combining with a preservative substance, etc. It is in the latter sense that the word is used today.

When one considers the enormous amount of fruit that is preserved each year in some form, it is strange that there is so little written upon the subject. Outside of cook books, to my surprise, I find very little about it; therefore what I have to say to you today comes only from knowledge gained by my experiments. I wish I were enough of a chemist to be able to tell you the why and wherefore of many things of which I shall speak. A knowledge of chemistry is very desirable for all who have occasion to do any cooking.

The most primitive method of preserving foods was by drying the raw article in the sun and air, and this is still practised to a great extent. Artificial methods are now used, but the sun develops in some fruits a flavor which is lacking when artificial heat is used. Although nearly every raisin grower in California has a drying house, he resorts to it only when the sun fails him. In the case of peaches, apples, and apricots, the fruit has a fresher and more appetizing appearance when dried in the evaporators, and its commercial value is, therefore, greater.

When drying fruit it is important not only that it shall be sound and of good quality, but also that it shall be prepared quickly and dried rapidly. When all moisture is expelled it will keep for years in a dry place.

*Copyright by Maria Parloa.

The second method of drying is to cook the fruit a long time, reducing it as nearly as possible to a paste, spreading this in thin sheets, and drying in the sun or by evaporation. When free from moisture this fruit can be packed in boxes and will keep indefinitely, and is suitable for transporting long distances, as for the use of armies or emigrants.

When fruit dried by either of these two methods is to be used, it must be softened by the addition of water and cooking.

A third process of drying is to cook the fruit for a long time with sugar and water, and then partially dry it. In this case the sugar is largely the preservative agent and the drying goes on only until no syrup drips from the fruit. With close packing in boxes or jars the fruit will keep well in any climate, hardening, of course, when exposed to the air for a considerable period. This fruit is ready for use at any time, but is more of a confection than a sauce.

These three methods enable all to have the figs, dates, prunes, apricots, apples, peaches, etc., of the world. Here in New England, where most of our fruits are preserved by canning, we are apt to lose sight of the enormous amount of wealth, health, and comfort that these methods of preserving represent.

The more modern process for preserving fruits, and by far the most useful and heathful, is that of canning. This seems to have been introduced to the French government in 1810 by Appert. Since then it has been constantly improving. The destruction of germs and the exclusion of air are the principles upon which canning is based. The article to be preserved is cooked for a short time and is then put in jars from which the air has been expelled by heating them to the boiling point. They are then sealed, and when cold are set in a cool, dark place. If all the conditions be right, the heating of the cans and fruit thorough, and if the cans, covers, etc., be in perfect condition, the fruit will keep for an unlimited number of years, and when opened will be found to have nearly all the freshness and aroma of newly-gathered fruit.

Now, this is true of the majority of fruits, but not of all. The strawberry subjected to this process will come out a pale, spongy, insipid thing, whereas the raspberry seems to have its color, flavor, and odor intensified. If, however, a generous amount of sugar be added to the strawberry in the cooking, it will retain its shape, color, and flavor. It is an error to attempt

to can this berry without sugar or with only a small amount. Neither can you put sugar with strawberries and let them stand, as with pineapple. The sugar seems to draw the juice out of the fruit and leave it a spongy mass.

Some fruits can be canned without heat or sugar. The jar should be packed full of the fruit and then placed under a faucet, having the water run in rapidly for a minute, that all the air in the jar shall be displaced; then seal, and put away in a cool, dark place. Perhaps not many kinds of fruit would keep if put up in this manner. Certainly, I should have no expectation of success with juicy fruit of any kind. I have, however, been successful with rhubarb, of which I have in the cellar now a dozen jars put up in this way last spring, and just as perfect as when first sealed up. Green gooseberries and some kinds of plums can be preserved in this manner. It is a question with me whether the acid in these fruits does not have a good deal to do with the keeping quality.

Many kinds of fruit can be mixed with their own weight in sugar, packed in jars, sealed, and put away in a dark, cool place. They will keep well, and have the flavor of the fresh fruit. I have found in the case of small berries put up in this manner that the seeds became harder and more noticeable than in the cooked fruit. I should not think of putting up pineapple in any other way than this, for it comes out simply perfect.

The third method of preserving fruit is by cooking it with sugar. In this case sugar is largely the preservative; and where the sugar is added to the fruit, pound for pound, it is not necessary to seal the product. But the "self-sealing" jars are so convenient that most housekeepers prefer to use them rather than the old-fashioned stone jars.

The French candied fruits are an example of another method of preserving fruit.

Having glanced at the various methods of preserving, it may be well now to consider some of the exact steps necessary to secure the best results. As drying is practised but little in this locality, there is no need to take that up again. More fruit is preserved by the exclusion of air than by any other method. To be successful in this, certain things are essential. First, the fruit must be perfectly sound; next, every utensil used in the process must be absolutely clean; again, the cans must be perfectly air-tight;

finally, the cans and fruit must be made free from germs and air before sealing, and the canned fruit must be kept in a dark, cool, dry place.

Now as to the different modes of treating various kinds of fruit. We know that when the germs are killed and the air is excluded, sugar is not necessary for the preservation of the fruit. But there are few kinds of fruit that are not improved by some sugar, because it fixes the color and flavor, and gives much finer results. Some kinds of fruit require but little sugar for this purpose, while others are poor indeed without a generous amount. One has only to contrast the flavor and quality of the canned peaches that are put up with and without sugar to realize the great superiority of those with which saccharine matter has been used. Where fruits are too dry to give out enough juice to cover themselves generously, a light syrup should be used. But in the juicy fruits, avoid water if possible. A good rule in the case of small berries is to allow one-third of a pound of sugar to each pound of fruit. There are people who would not care for more than half that amount of sugar, while others might like more. Here is a method I would advise for small berries: Have twelve quarts of berries picked clean. Put three quarts into the preserving-kettle and on the fire. Heat slowly, and break up with a wooden vegetable masher. Now turn the fruit into a piece of cheese-cloth and press out the juice. Wash the preserving-kettle, and put the juice and sugar into it, stirring until the sugar melts. When the syrup boils, skim it, and add the whole berries. Watch the kettle, stirring occasionally until the preserve boils; then skim, and cook for ten minutes longer. Fill the jars, and seal.

For fruit like peaches, pears, plums, etc., make a light syrup in this manner: Put into the preserving-kettle four quarts of sugar and two of water, boil, and then skim well. Have the fruit pared, and cook it gently in this syrup until tender; then can, filling up with syrup. Quinces must first be cooked in clear water until tender.

In paring fruit, use silver-plated knives, and drop each piece as soon as pared into a bowl of cold water which has been made acid by the addition of lemon juice. This prevents the fruit from turning dark. Use earthen bowls and wooden or silver-plated spoons. Avoid any delay while doing this work.

To peel peaches and plums, put a little of the fruit into a wire

basket and plunge it into boiling water for a few minutes. Take the basket from the boiling water and plunge it into cold water for a few seconds. Then turn it into an earthen dish and peel with a silver knife. Save all the juice that falls into this bowl. When the work is properly done the skin will peel off perfectly smooth. There is really less waste and less labor in removing the skins of fruit in this way than in the common way.

To fill the jars, have on the stove two pans partially filled with water. Let the water in one be boiling, but in the other not so hot that the hand cannot be held in it with comfort. Put a few jars and covers in the cooler water, turning them now and then until all parts become warm; then put them in the boiling water. This does away with all danger of breaking. When the jars have been heated in boiling water, drain, fill, and seal them at once.

In filling the jars be sure that they stand level, that the syrup has filled all the interstices between the fruit, and that it also runs over the top of the jar. Even with this overflowing of the syrup, it will be found that, after cooling, the can is not full; but if the work has been properly done, the fruit will keep all right.

Preserving with sugar, pound for pound, is not very extensively practised now, most people preferring the simpler and more healthful mode of canning with a small quantity of sugar; still, there are some things that are better when done in this way. I think there is no fruit more delicious than the strawberry, either fresh or preserved, yet there is none about which the housekeeper feels more uncertain. It is something that cannot be preserved without plenty of sugar. I have experimented a great deal with it, and here is a rule that will give you the greatest satisfaction. It is true, the preserve is very rich, and cannot be eaten in large quantities, but it is better to have a little in perfection than a great deal of an unsatisfactory quality.

Sun-Cooked Strawberries. — Use fine, ripe strawberries. Put them in the preserving-kettle with a pound of sugar to each pound of berries; first a layer of fruit, then a layer of sugar, and so on. Do not have the mixture more than six inches deep. Place on the fire, and watch. When the preserve begins to boil, skim carefully, and simmer for ten minutes. Now pour the fruit into meat platters, and place in the sun. After an exposure to the sun for twenty-four hours, put them up in jars or tumblers, and cover. You may say the sun does not shine twenty-four hours, but I put

my fruit on tables by the windows in a sunny room, and let it remain there for several days, or until it has had its full sun bath.

Rum Pineapple. — Putting up pineapple raw, in its own weight of sugar, is not a new thing, but, strange to say, my first knowledge of it was gained only a few years ago. Pineapple will keep perfectly without any spirits if properly put up, but I think a little rum, wine, or brandy adds to the flavor of the fruit. My method is to pare the pineapple, and then, with a sharp knife, cut it into thin slices, cutting down the sides until the core is reached. It is then weighed, mixed gently with its own weight in sugar, packed solidly in pint jars, and covered with one tablespoonful of either Santa Cruz rum or the same quantity of wine or brandy. Seal the jars and put them in a cool, dry place. I much prefer the sliced to the shredded pineapple; still that is a matter of taste.

If one wishes to preserve the pineapple by cooking, care must be taken that it is not exposed to a high temperature for any length of time, as cooking hardens and darkens the fruit. Slice or shred it, and put it in an earthen dish. Mix with the sugar, allowing from a quarter of a pound to three-quarters for every pound of fruit. Let this stand for several hours, or all night; then turn into the preserving-kettle, and heat slowly. Skim when it begins to boil, and cook for only two minutes; then can it.

The Larger Fruits. — All fruits are prepared for preserving in sugar the same as for canning. Then a rich syrup is made — four pounds of sugar to a pint of water — and the fruit is simmered in it until tender and clear. Such fruit as quinces and hard pears should be cooked until tender before being put in the syrup.

When the Sugar should be added. — Some kinds of fruit are better for having the sugar added to them when partially cooked, while others should always have it added the moment they are placed on the fire. Again, one kind is better for standing for hours in the sugar, while others should not have the sugar touch them until they are ready to go on the fire. There are a few fruits which are far better without sugar than with it. This is the case with the prune, with which sugar should never be put, long, slow cooking serving to develop a fine, rich flavor. Cranberries, on the other hand, should have a pint of sugar to a quart of berries, and the sugar, water, and berries must go on the fire at once and be cooked rapidly for a short time, say twelve to fifteen minutes. No other method will give a satisfactory result.

These last two suggestions do not properly come under the head of preserving, but I use them to illustrate the fact that the treatment that makes one dish perfect may ruin another.

Jelly Making.—In no department of preserving does the housekeeper feel less sure of the results than in jelly making, so much depends upon the condition of the fruit. This is more pronounced in the case of small fruits than with the larger kinds.

When currants are over-ripe, or have been picked after a rain, the result of using them will be very uncertain. Perhaps we notice it more with this fruit than with any other, because it is so generally used for jelly. An understanding of the properties in fruit which form the basis of jellies may help the housekeeper to a better knowledge of the conditions and methods essential to success.

Pectine, which forms the basis of vegetable jellies, is a substance which, in its composition, resembles starch and gum. It gives to the juices of fruits the property of gelatinizing. This property is at its best when the fruit is just ripe — better a little under-ripe than over-ripe. When boiled for a long time it loses its gelatinous property and becomes of a gummy nature.

These facts show the importance of using fruit that is but just ripe and freshly picked, as well as the need of care not to overcook the juice.

Canning Fruit Juice.— One form of preserves which is most useful, convenient, and wholesome should be more generally adopted than it is; namely, the canning of fruit juice for creams, ices, drinks, etc. Certainly every housekeeper ought to preserve enough of the juices of the strawberry, raspberry, peach, apricot, grape, etc., for her own use. They can be preserved with or without sugar, but I should always advocate sugar. Boil for ten minutes and seal while boiling hot.

Discussion.

Miss Parloa was asked how to make strawberry jelly. She replied that it was very difficult; there appeared to be a deficiency of the gelatinous principle, and that a more acid fruit would be preferable.

Cranberries and prunes are more often found poorly cooked than any other fruits. The former need considerable sugar, but the latter are much better without any. The essayist had met

people who did not fancy prunes. She had tried all kinds; the California fruit was disliked by some because the flesh clung to the stone. She bought a pound, put it in a quart of water, and cooked it slowly about three hours, and without any addition the sauce proved delicious.

In making cranberry jelly, a scant amount of water should be added to the fruit for cooking; strain through a fine sieve, then put it into moulds.

Miss Parloa repeated her remarks about pectine, to impress upon the minds of the audience the fact that much cooking of fruit in making jelly tends to impair the quality of the jelly; and that in many cases the product is not jelly because that principle in the fruit had been expelled by the cooking, leaving a thick, syrupy fluid.

As this was essentially a "Ladies' Day," the discussion assumed a more conversational character than usual, entirely without formality. The lecture was illustrated by a jar of strawberries, sun-cooked as recommended, which were tasted and highly approved.

The announcement for the next Saturday was, "Arbor Day in Schools," by Rev. Birdsey G. Northrop, Ex-Secretary of the Connecticut Board of Education, Clinton, Conn.

BUSINESS MEETING.

SATURDAY, February 27, 1892.

An adjourned meeting of the Society was holden at eleven o'clock, the President, WILLIAM H. SPOONER, in the chair.

Gen. Patrick A. Collins, of Dorchester, was proposed by Charles N. Brackett, as a Life Member of the Society.

On motion of E. H. Hitchings, it was voted that a Committee on Window Gardening, of seven members, be appointed by the Chair. The President stated that he would report the Committee at the next meeting.

Adjourned to Saturday, March 5.

MEETING FOR DISCUSSION.

Arbor Day in Schools.

By B. G. Northrop, Ex-Secretary of the State Board of Education of Connecticut, Clinton, Conn.

A brief sketch of Arbor Day in schools, its aims and results, will show its relation to horticulture. Arbor Day for economic tree-planting, and Arbor Day in schools, differ in origin and scope. The former was originated by Ex-Governor J. Sterling Morton in Nebraska in 1872. In January of that year the State Board of Agriculture heartily endorsed his plan, and offered liberal prizes for its encouragement. The newspapers of the State strongly commended the scheme, and the founder eloquently advocated it by pen and tongue. The result was a marvellous success the first year, and still greater success the second and each subsequent year. In 1874 Robert W. Furnas, then governor, issued the first Arbor Day proclamation ever made. In 1885 Arbor Day was made a legal holiday by the Legislature, and its observance has been growing in interest and usefulness from that day to this. So broad and beneficent have been the results of the Arbor Day movement in Nebraska, that its originator is there gratefully recognized as a great benefactor of the State — now the leading State in America for tree-planting. It glories in the old misnomer of the geographies "The Great American Desert," since it has become so habitable and hospitable by cultivation and tree-planting. Where, twenty years ago, the books said trees would not grow, the settler who does not plant them is now the exception. The Nebraskans are justly proud of this great achievement, and, with the demonstration made all over the State of the cash value of their planted forests, both for fuel and lumber, are determined to maintain this preëminence.

I have been thus explicit as to the origin of Arbor Day because it has so often been erroneously attributed to me. Though over twenty years ago I advocated tree-planting by youth, in the press and in official State reports, and in January, 1876, started the scheme of centennial tree-planting (a suggestion seconded by the press of Connecticut and transmitted across the continent) and offered a dollar prize to every boy or girl in Connecticut who should plant or *help in planting* five "centennial trees," — an offer which met an unexpected response over the State, still, the

happy idea of designating a given day, when all citizens should be invited to unite in this work, was not mine, but was duly credited by me in the "Century Magazine" and other journals, to its proper source.

In this grand work initiated by Governor Morton, its application to schools was not named. The great problem then was to meet the urgent needs of vast treeless prairies. At the meeting of the American Forestry Association, held at St. Paul, Minn., in August, 1883, a resolution which I offered in favor of observing Arbor Day in schools in all our States and in the provinces of the Dominion of Canada (the association being international) was adopted, and a committee to push that work was appointed. Continued as their chairman from that day to this, I have presented the claims of Arbor Day personally or by letter to the governor or State school superintendent in all our States and Territories. My first efforts were not encouraging. By men in high positions Arbor Day was deemed an obtrusive innovation. It was no surprise to me when my paper on "Arbor Day in Schools," read at the National Educational Association (Department of Superintendence) at Washington, in February, 1884, called out the comment, "This subject is out of place here." Though that paper was printed by the United States Bureau of Education, it *was* a grateful surprise that the next meeting of the National Educational Association, held in August of the same year, at Madison, Wis., with an unprecedentedly large attendance, unanimously adopted my resolution in favor of Arbor Day in schools in all our States.

The indifference of State officials at the outset was expected, and therefore occasioned no discouragement. A governor of Massachusetts, for example, received me personally with courtesy, but my proposition with coolness. That incident increased my pleasure in listening to the admirable address given in this hall September 22, 1886, when Governor Robinson eloquently welcomed the American Forestry Association to Massachusetts and expressed his sympathy with all its aims. In like manner the indifference of Governor Oglesby, of Illinois, was followed by active interest. He kindly named but one of the objections obviously in mind; for, to use his own words, that was "insuperable — the great variation in our climate, extending, as Illinois does, five and a half degrees, from the latitude of Salem, Mass., to that of Petersburg, Va." To which I replied, "Why

not designate two days, one early, and another later for the northern section, as is done in Canada?" On the first Arbor Day of Illinois, Governor Oglesby procured an elm and set it out on the State House grounds, digging the hole himself. The other State officers followed his example, planting in all fifteen trees of various kinds. Other governors and school superintendents, who at first were apathetic, on fuller information have worked heartily for the adoption of Arbor Day. The logic of events has answered objections. Wherever it has been fairly tried, it has stood the test of experience. Now such a day is observed in forty States and Territories in accordance with legislative act, or by special recommendation of the governor or State school superintendent, or the State grange, or the State horticultural and agricultural societies, and in some States, as in Connecticut, by all these combined. It has already become the most interesting, widely observed, and useful of school holidays. It should not be a legal holiday, though that was no doubt a wise provision for the once treeless prairies of Nebraska. At the meeting of the American Forestry Association held in Washington in December last a resolution was passed against efforts to make Arbor Day in school a legal holiday, for in some States such efforts defeated or delayed the passage of an Arbor Day law.

Popular interest in this work has been stimulated by the annual proclamations of governors and by the admirable circulars and programmes of school superintendents — the latter sent to every school in the State. The excellent proclamation of the lieutenant-governor of the Province of Quebec nine years ago (one of the first of the kind issued on this continent) predicted that Arbor Day "would become one of the institutions of the country, in which our boys and girls will take an eager share and genuine pleasure, and thus gain a liking for trees that will never be effaced" — a prediction happily verified in that province, largely through the efforts of Hon. H. G. Joly, of Quebec, whose address in this hall five years ago many of you remember.

Arbor Day has fostered love of country. It has become a patriotic observance in the Southern States, which have fixed its date on Washington's Birthday. Having lectured in all the Southern States except Arkansas, I have been delighted to find there as true loyalty to the stars and stripes as in the North. Mingling freely with former officers in the Confederate service,

I have often asked the question, "Have you any lingering regrets that you did not succeed in the war?" The answer of one is substantially that of all, "Not a bit. Our success would have proved a lasting disaster. Our defeat in arms is already the source of our prosperity in peace." It was to me a scene of thrilling interest at De Funiak Springs, Fla., when such an enthusiastic crowd, young and old, gathered to plant a State tree for every State in the Union around their beautiful lake, besides memorial trees to Washington and other patriots and philanthropists. A brief State panegyric was made at the dedication of each tree. A cablegram received the day previous from the Baroness Burdett Coutts welcomed such a tribute, and a memorial tree was planted to her. It was my lot to make the "eulogy" in dedication of that tree.

This custom of planting memorial trees in honor of Washington, Lincoln, Grant, Garfield, and other patriots, and also of celebrated authors and philanthropists, has become general. Now that the national flag with its forty-four stars floats over all the schoolhouses in so many States, thanks to the earnest appeals of the "Youth's Companion," which inaugurated this movement in 1888, and in this as in other ways has become a national educator, patriotism is effectively combined with the Arbor Day addresses, recitations, and songs. Among the latter, the "Star Spangled Banner" and "America" usually find a place. Who can estimate the educating influence already exerted upon the myriads of youth who have participated in these exercises! A few educators in high official positions still stand aloof, whose coöperation is greatly desired and still expected.*

* An excellent "Circular for Arbor Day" was sent early in April, 1892, by the State Board of Education of Massachusetts — two copies to each public school in the state — to remind them of the day and to suggest to them some plan for its observance. A single paragraph from this circular of Hon. J. W. Dickinson merits insertion here:

"The planting of trees and shrubs may be made a most useful object lesson for the public schools. It may furnish a good occasion for directing the attention of the children and youth to the proper care of trees, to the marks by which the different kinds are distinguished from one another, to their economic value, to their influence on health, to their effect on the landscape and on the human mind, if it is led to know their qualities, their habits and their uses. Arbor Day has become one of the most interesting and most generally observed of the school holidays. The State Board of Education, therefore, recommends that the public schools of the Commonwealth observe Arbor Day by planting trees, shrubs, and flowers, in connection with such exercises as will have a tendency to cultivate in the minds of the children and youth a love of nature, of our free institutions, and a love of the great and good Being who is the author of all things."

The following resolution, passed by the National Educational Association, at Sara-

This custom has been heartily recommended by the eminent authors of America. The Arbor Day circulars within the reach of every scholar contain choice selections in prose and poetry (many of them written for Arbor Day celebrations) on the value and beauty of trees. What growth of mind and heart may come to our youth as they learn these rich gems of our literature, and still more as they are thus led to apply them by planting and caring for trees! What multitudes of youth have thus united sentiments of patriotism, and the study of literature and history, with the love of trees, vines, shrubs, and flowers, and thus with the love of Nature in all her endless forms and marvellous beauty!

It was formerly my privilege to travel widely over Massachusetts, both by carriage and cars, with that eminent arborist, George B. Emerson, long a member of this association and of the Massachusetts Board of Education, and author of "Trees and Shrubs of Massachusetts." To show how susceptible is the juvenile mind when consciously brought into contact with Nature by a teacher competent to be her interpreter, he told me the following incident as the turning point in his history: "When I was a mere boy my teacher handed me a flower, saying, 'Be sure to notice *all* its parts.' And when I had done so, for the first time in my life — for I had never before truly seen a flower — he gave me their several botanic names, introducing each with its Saxon synonyme, which I never forgot. That brief talk of twenty minutes inspired me with an interest in observation and study of Nature that led to liberal culture." How heartily would he have welcomed Arbor Day in the Massachusetts schools! Mr. Emerson's experience shows that love of knowledge is the vital force in education, preparing the soil and fertilizing the seeds of truth. It is the parent of perception and attention, of memory, imagination, and expression. Though at first a restless instinct, it should mature into a ruling passion. Curiosity should be to the mind what appetite is to the body, creating a hungering for knowledge — the mind's food. Love of truth was as strong a passion with Emerson or

toga, in July, 1892, is another indication of the progress of the Arbor Day movement since this address was given:

"Your committee reports with pleasure that Arbor Day is now observed in accordance with legislative act, or annual public proclamation, in forty states and territories. We recommend that the observance be universal, that village and district improvement associations be formed, that memorial trees be planted and that appropriate means be employed to inspire in pupils and parents the love of beauty and a desire for home and landscape adornment."

Agassiz as love of conquest with Napoleon. Under its healthful inspiration, study is a pleasure; without it a task; often the dullest drudgery.

To the teaching of forestry in schools, it is objected that the course of study is already overcrowded — and this is true. But I have long urged that trees and tree life and culture form a fit subject for the oral lessons now common in all our best schools. When agent of the Board of Education of Massachusetts, I sometimes took to the schools and institutes a collection of our common woods, as an object lesson, one of many aids in observation, discriminating wood by the grain. The same plan was occasionally tried in Connecticut, and with good results. To give one of many illustrations: A citizen of Norfolk, Conn., offered eighteen volumes of "Appleton's Science Primers" to any pupil who should gather and arrange the largest and best collection of the different kinds of wood, shrub, or vine growing in that town. Great interest was awakened, and one hundred and thirty-five varieties were gathered by all the competitors, of which the collection of Washington Beach (who won the prize), numbered one hundred and twenty-five. What a discipline in quickness and accuracy of perception those school-boys gained while exploring the fields, hills, and mountains of this large town, and discriminating all these varieties by the grain or bark! With no interruption of studies, there was a quickened zest and vigor for school work, and, best of all, that rare and priceless attainment, a trained eye. John M. Woods, of Somerville, has given a similar object lesson by placing a grand collection of one hundred samples in the high school in an elegant case, and a smaller collection of twenty-five specimens in each grammar school. A child thus trained to discriminate such simple objects gains a power which has endless applications.

In the school geographies pupils learn of the trees and plants in foreign lands, while they are ignorant of those growing right about them. One farmer in Norfolk, astonished at seeing these varieties, admitted that he could not distinguish one-half the kinds found on his own farm. Professor Brewer, of Yale University, says: "I have recently talked with students, sons of well-to-do families, who could not give the names of three kinds of trees in our streets. They have grown up as ignorant of the trees of our forests and the crops of our fields as a Hottentot grows up ignorant of the

stars." At the meeting of the American Forestry Association, at St. Paul, Minn., the president of the school board of that city, while advocating the resolution in favor of Arbor Day, said, "I am confident, from conversation with them, that not one in ten of the teachers of this city can recognize by sight ten of the commonest trees growing in this region." Since that date what a change has Arbor Day wrought in the sentiments and practical attainments in this line of both teachers and scholars! A single sentence quoted from a State school superintendent, who has tried to secure the observance of Arbor Day in every district of his State, answers this question: "Any teacher who has no taste for trees, shrubs, or flowers is unfit to be placed in charge of children." Arbor Day has effectively repeated and enforced the same idea in many States. The preparatory lessons have occupied little school time, and interfered with none of the regular studies.

Habits of observation have been formed which have led youth in their walks, at work or play, to recognize and admire our noble trees, and to realize that they are the grandest products of nature, and form the finest drapery that adorns the earth in all lands. Those talks on trees, which Superintendent Peaslee says "were the most profitable lessons the pupils of Cincinnati ever had in a single day," occupied only the morning of Arbor Day, the afternoon being given to the practical work. Since 1883 our schools have rendered new service to the State as well as to their pupils by leading them to study the habits of trees, and appreciate their value and beauty — thus tending to make practical horticulturists and arborists. How many of these children in maturer years will learn from happy experience that trees, like grateful children, bring rich filial returns, and compensate a thousand fold for all the care they cost! George William Curtis says, "Arbor Day will make the country visibly more beautiful year by year. Every school district will contribute to the good work. The school-house will gradually become an ornament of the village, and the children will be put in the way of living upon more friendly and intelligent terms with the bountiful Nature which is so friendly to us."

Thomas Arnold says, "I would rather that a son of mine believed that the sun went round the earth than that he should be entirely deficient in knowledge of beauty, of poetry, and of moral truth."

During the last Arbor Day exercises of New York, the teachers of the State were requested to express their choice by vote for the best American poem on trees. More than half of the total number of ballots cast were in favor of Bryant's "Forest Hymn." Will not these voters be likely to justify that choice by illustrating and enforcing in their schools the noble sentiments of that hymn? The State Educational Report of New York, every year since its adoption of Arbor Day, has devoted over twenty pages to information and suggestions for its appropriate observance. In 1889 all schools were invited to vote for a State tree. The maple was then chosen as the New York tree. In 1890 those who participated in the Arbor Day exercises voted for a State flower. Of the total votes cast, no one had a majority, though the rose and the golden-rod were the favorites. In 1891 a second vote for State flower was taken, the choice being confined to the rose and golden-rod, when a somewhat exciting contest occurred. One hundred and thirteen school commissioners' districts (all but one) and thirty-two cities (all but Troy) participated, and 501,218 votes were cast. The majority of the rose over the golden-rod was 88,414. It is easy to satirize these votes of school children, but no such ridicule comes from thoughtful minds in sympathy with childhood. In the State of New York only Troy and "First Alleghany" stood aloof. The discussions of the older scholars, the talks with teachers and parents, and, best of all, the study of flowers and trees by the pupils in anticipation of Arbor Day votes must have been healthful and suggestive to these half million of voters.

In his annual report dated January 22, 1892, just issued, the State Superintendent, Judge Draper, says: "It is gratifying to note the increasing enthusiasm and interest manifested in the celebration of Arbor Day. In 1889, 5,861 school districts observed the day. In 1890, 8,106 districts participated, and in 1891 8,955 districts observed the day; that is, an increase in the last observance over the first of 3,094 districts, and in these three years 77,082 trees were planted." Mr. Draper is now recognized as the most efficient State superintendent of schools New York has ever had. The success of Arbor Day is only one of his many achievements which now call forth so general a protest from the friends of education, irrespective of party, against his removal on political grounds, and prompted many petitions to the Legislature that

he be retained in office as a just recognition of his invaluable services.

Interest in Arbor Day has been greatly stimulated in New York during the last two years by the prizes offered by William A. Wadsworth of Geneseo for the best kept district school grounds. The park district of Columbus, which won the first prize in 1890, contains one and an eighth acres. Arbor Day had been observed there since it was first recommended by the American Forestry Association, six years before it was observed by the State of New York. Fifteen varieties of choice trees and shrubs are growing on those grounds. The sole trustee of the district, D. L. Norton, who was a practical horticulturist, volunteered, out of school hours, to teach the pupils to bud and graft trees, and was delighted by their eagerness to learn and apply the lesson on trees around their homes. So happy has been the influence of these prizes that Mr. Wadsworth is likely to continue this offer ($150 a year) indefinitely.

Through the influence and liberality of an officer of this Society, Mr. J. D. W. French, the Village Improvement Society of North Andover, Mass., has successfully tried a similar experiment. In 1889 that society offered three prizes for the best kept and most improved grounds in the town. The offer has been continued each subsequent year, and the good results have exceeded the expectations of the donor. Trees and shrubs have been planted, flower-beds have been laid out and filled with plants, and the interest in this work has increased from year to year. Is not such an example worthy of imitation?

Indiana and Pennsylvania have kept Arbor Day both in spring and autumn. Pennsylvania is still the banner State in this work, by reason of the enthusiastic efforts of the late Dr. Higbee, who wrote more and spoke more in behalf of this observance than any other State school superintendent. He made earnest appeals to all teachers, school officers, and friends of education, "to give this good work all possible encouragement, putting the thought and work of tree planting into the schools. The boys and girls should be encouraged to collect and plant seeds and nuts of various kinds, and watch their growth and care for them. This being done, they will soon be enabled to plant, and also to give or sell to others, from their own modest nursery stock. This is a work, not for a day or a year, but for the profit of the next and succeeding genera-

tions. Every teachers' institute should discuss this subject, and every normal school should give it earnest attention." Since such stirring messages were sent to every teacher and school of Pennsylvania, one is not surprised to hear that over three hundred thousand trees have been planted on the successive Arbor Days in that State. Who can estimate the influences thus exerted on minds as well as on grounds — influences that will go on broadening through all time. In Illinois, Hon. Richard Edwards, the State superintendent, who planted a hard maple after Governor Oglesby had put in his elm, worked zealously for the universal observance of Arbor Day, and as a result ten thousand districts were reported as keeping the day; so everywhere the success of this observance answers to the interest or indifference of the State school superintendent.

If space permitted, quotations might be cited from many school officials showing increasing interest in this anniversary. Maine reports, "After six years' observance Arbor Day is growing more in popular favor, through the efforts of the press, the granges, and the Schools." Iowa has observed this day with peculiar interest. An elaborate circular has been annually sent to each school. The special effort last April was to develop local patriotism — State, county, and town pride. In the circular for 1891, Iowa writers paid tribute to Iowa trees, Iowa flowers, Iowa birds, and Iowa history. The spirit of the people is set forth in the words of a benefactor of his city (Grinnell) and of the State: "Massachusetts is a great State, but Iowa is greater; Boston is a great city, but Grinnell is better." Whatever binds one to his home and town strengthens his love of country and nurtures all the better elements of his nature. Patriotism does not thrive in the soil which produces no local attachments. The nomad, without a home, as content in one place as another, and happy nowhere, is like a tree planted in a tub — portable, indeed, but at the expense of growth and strength. With the same desire to awaken civic pride and local interest the Arbor Day circular by John Terhune, county superintendent of Bergen county, N.J., is filled with choice gems — all with two exceptions prepared for this occasion by writers from the different towns of that county.

Many school grounds are too small to admit of ornamentation; sometimes smallest where land is cheapest, and totally inadequate to the necessities of the schools. Arbor Day has started efforts

for their enlargement. State school reports now widely call attention to this defect, and urge that every school should have at least half an acre of land, and much more if possible. As so many school yards are now amply supplied with trees or shrubs, I have urged the planting of vines, especially the beautiful Japanese ivy, where the buildings are of brick or stone. Of course it should not cover any portion of the windows. We are beginning to learn the sanitary value of sunlight. It is a mistake to plant big trees, or trees of large capacity, in little yards, or close to homes or schools. "Where the sunlight cannot come the doctor must." In large cities there may seem to be little room for further improvement, and no call for even a half-holiday for this work, but even there appropriate literary exercises would be useful, and there are few homes where children cannot find some place for shrubs, vines, or flowers, if not for trees.

In Baltimore on their first Arbor Day the pupils of all the public schools spent two hours of the morning at their different buildings in appropriate exercises, such as recitations, reading short original essays about trees, interspersed with songs by the whole school, and then went to the different parks and planted a variety of trees, naming them after the governor, the mayor, the founder of the Enoch Pratt Library, and others. The boys and girls were glad to go out and see those beautiful parks. Parents and friends joined in the joyous procession, and helped in planting trees. What grand object lessons for the study of trees, shrubs, and vines are furnished the youth of Boston and its vicinity by its magnificent Arnold Arboretum and its parks, already extensive, and to be unrivalled when the Boston Metropolitan Park movement includes the unique and romantic Middlesex Fells and the Blue Hills.

Arbor Day in schools has proved an effective method of calling attention to the importance of economic tree planting. In New England, and all the Atlantic States, there are large areas of barrens, worthless for field crops, that may be profitably devoted to wood growing. Our Atlantic sand plains, that were once covered with woods, can be reforested. Over ten thousand acres on Cape Cod, which thirty years ago were barren sand plains, are now covered with planted forests. The two hundred acres of forest at Wood's Holl, of Hon. Joseph S. Fay, and the three hundred acres of planted trees of H. G. Russell, of East Greenwich, R.I., are

genuine object lessons for New England. On almost every farm there are waste places, where trees might be earning dollars for their owners, growing by the brook or river, or on hillsides, or overhanging cliffs too steep for cultivation.

Arbor Day has proved as memorable for the home as for the school, leading youth to share in dooryard adornments, and in planting trees by the wayside. Much as has been done on limited school grounds, still greater improvements have been made on the homesteads and the roadsides. The home is the objective point in the hundreds of village improvement societies recently organized. The old motto, "As is the home so is the school," or conversely, "as is the school so is the home," suggests the close connection of these vital forces. The earnest advocacy of village improvement by the "New York Tribune," "Youth's Companion," and many other leading papers has given a new impulse to this movement, so that probably more of these societies have been organized during the last year than in the previous ten years.

The United States census of 1890 shows that there has recently been a remarkable increase of interest in horticulture, arboriculture, and floriculture. The reports collected from 4,510 nurserymen give a grand total of 3,386,855,778 trees, vines, shrubs, roses, and plants, as then growing on their grounds. Arbor Day in schools and village improvement societies are not the least among the many happy influences which have contributed to this grand result.

On the platform was a large glazed frame containing one hundred specimens of forest woods, mostly of varieties used in the arts. It is the property of the Somerville High School, to which it was presented by John M. Woods, a Boston dealer in hard wood lumber, but a resident of Somerville. The collection of woods attracted considerable interest and attention.

Discussion.

Leverett M. Chase said that he had thought very much upon this subject, and wished to get practical facts to be used in promoting the education of the people of the old Bay State in the science and art of arboriculture, and in the profit and other benefits to be derived from it. We are far behind other States in this matter. Very little has been accomplished among us for lack of

a leader in a systematic carrying out of the ideas or the principles involved in the term Arbor Day. In several of the other States the authorities have issued circulars, containing directions for appropriate exercises, by either communities or schools, to precede the planting of trees for ornament or shade for the public good. In some cases these were distributed through the public schools, thus reaching most families, and have been productive of good results. In conversation with his classmate, Governor Prescott, of New Hampshire, that gentleman said he had found that the most valuable parts of that State were the forests and the mountains.

Mr. Chase then presented the following preamble and resolution:

The Massachusetts Horticultural Society respectfully petitions the Legislature of Massachusetts to adopt the following resolution in addition to the resolve relating to the establishment of Arbor Day, approved April 7, 1886, which resolve is as follows:

Resolved, That His Excellency the Governor is requested to set apart in each year the last Saturday in April as Arbor Day, and to issue his proclamation recommending that it be observed by the people of the Commonwealth in the planting of trees, shrubs, and vines; in the promotion of forest growth and culture; in the adornment of public and private grounds, places, and ways, and in such other efforts and undertakings as should be in harmony with the general character of the day so established.

The proposed additional resolve is as follows:

Resolved, That the Secretary of the Massachusetts Board of Education be authorized and requested to present from time to time in writing a course of exercises on the subjects hereinbefore mentioned, which shall be adopted by the public school authorities, and upon receipt of copies of such course, sufficient in number to supply all schools under their supervision, the school authorities aforesaid shall seasonably provide each school under their charge with a copy and cause it to be observed on the Friday next preceding Arbor Day.

Mr. Chase stated that the object sought in presenting this resolution is to begin at once in this State, where it has been too long neglected, the work which has been so well outlined before us today. Massachusetts should be brought to the front rank in this direction, and by commencing in the schools appears to be the most direct method of accomplishing that object.

The preamble and resolutions were by vote referred to the business meeting on the next Saturday.

J. D. W. French said that if there is one thing lacking more than any other, in the results of the training given to the pupils in our common schools, it is the power of observation. The great tendency of nearly all the instruction given is toward mercantile or kindred pursuits. As a natural effect of this course, we find that as soon as young people reach an age to take up any productive avocation, they naturally throng to the cities as the centres of all the branches of industry for which they are fitted. The consequence is that country homes are deserted, and the farmer-parents must either end their days alone, or abandon the farm and follow the children to the bustling, noisy, and confusing commercial towns. There are in this Commonwealth between sixty and seventy village improvement societies; the oldest of them is in Stockbridge. While some of them are active, and do good work, the majority accomplish very little. The difficulty with these inactive associations is that although they desire to do something to improve the appearance and attractiveness of their towns, they are unable to *see* what is necessary to be done to effect that object. This is another evidence of this defect in the education of the people. All this should be changed. It can be done by cultivating in the children the power of observation — the power to *see*, which develops a desire to understand — to know the things seen. Training of this kind cultivates a love for the beautiful in scenery, the study of nature, and the freedom of country life. With a view to promote a change in this direction, Mr. French presented the following resolution, which he hoped this Society would adopt:

Resolved, That in the opinion of this Society the study of natural science, including botany, horticulture, forestry, and entomology, should be more generally taught in all the schools of this State, to promote among the children a better knowledge of the natural objects surrounding them, thereby encouraging a greater love for country life.

Rev. Charles S. Harrison said that many village improvement societies are doing a good deal in drawing attention to this matter; some others are very careless. There is very much complaint that heedless people fasten their horses to ornamental trees, which often suffer great injury thereby. Mr. Harrison asked if there is no way to punish such offenders.

Mr. French said he had lately read again the paper on "Horticultural Education for Children," by Henry L. Clapp, published in the TRANSACTIONS of this Society of 1890, Part I., and he wished it might be read by every person present. In France there are over twenty thousand gardens connected with the public schools, wherein object lessons are given in all departments of horticulture. The healthful influence this system must exert upon public sentiment, in respect to trees, and in many other directions, can hardly be over-estimated.

Mr. Chase was pleased to hear a reference to Mr. Clapp's paper, and he wished all present here today would visit Mr. Clapp's school — the George Putnam School in Roxbury — to see the work there, and how it is done. He wished them to see that while the children accomplish all of the usual course of study, there is a large amount of horticultural work performed in addition. He thought the reason was that the horticultural part was so refreshing that it inspired the children to do all their work with a *vim* that was surprising to any observer. We often find that the busiest of business men are those who take hold of horticulture with the best results; while many who have no business neglect their own homes, and most often indulge in criticism of their neighbors. Teachers sometimes feel that there is great need of some wholesome interruption of the humdrum grind of continuous study. The horticultural exercise awakens an interest akin to enthusiasm, which has a strong effect upon them after returning to their regular school work. Every one can appreciate the difference between persons possessing enthusiasm and those destitute of it.

Mr. Northrop, in reply to Mr. Harrison's question, said that the best protection of shade and ornamental trees is a strong, healthy, public sentiment. There should be such a general reprehension of the practice of hitching horses to trees as will educate all the people out of such habits. In America, public opinion is all-powerful. Arbor Day observance will do immense good in this direction. This great result, which must be the work of time, will be best accomplished by leading the young and old to admire trees, and to plant them, and then they will be sure to protect them. We need to popularize the *sentiment* of trees in order to secure their propagation and protection. The frequency of great fires in the woods is the common objection to economic tree plant-

ing. But let the *sentiment* of trees be cultivated, both in schools and in the family, and they will be regarded as our friends, as they are in Germany. The custom of holding Arbor Day exercises will diffuse the conviction that the interests of all classes are concerned in the planting of trees and the conservation of forests. In Germany, Switzerland, Sweden, and other European countries, this subject is so taught in their schools that the people generally appreciate the value of trees and the need of protecting them; and this enlightened public sentiment is a better guardian, both of roadside trees and of forests, than is a national police.

Mr. Chase suggested that Mr. Harrison drive out to Copeland street, Roxbury, and hitch his horse to one of the shade trees there. He would soon learn, by experience of prosecution, that a way exists to protect trees and to punish those who wantonly or heedlessly cause injury to them. There have been two prosecutions of this sort, by John M. Way, which have taught the offenders a costly lesson in this respect. Persons who plant trees, even in the public streets, have a property in them, and can protect them. The speaker had received a report which gives some idea of the effect which an interest in Arbor Day exercises. In a village in Nova Scotia there existed a cause of public discord. Arbor Day exercises being proposed, there was a movement to set trees upon a certain point of land. In time some five or six hundred trees had been planted, which work had so engaged the attention and interest of the people who had coöperated in the undertaking, that the element of discord which had previously existed was entirely banished. The tree planting had developed the spirit of sympathy and love, and had also broadened the religious life in the community, and the propensity to controversy quietly dropped out from their midst.

Francis H. Appleton hoped that what had been said at this meeting would be taken home by all who had been present, and that in time its influence would yield fruit in good Arbor Day work, both on that day and other days also. The planting of trees on the roadsides should draw attention to the quality of the roads. New Hampshire takes care of many summer visitors. Massachusetts might also keep many more summer guests within her borders if her beautiful country scenery was more developed. Such persons, when in the country, desire to ride and to walk about; therefore it is desirable and important that the roads be not

only conveniently located, but in a good, attractive, and safe condition, so that in both riding and walking pleasure-seekers, as well as agriculturists and other workers, may enjoy either mode of exercise upon them. Now is the time to attend the "hearings" of the Legislative Committee on Roads and Bridges, and impress upon its members the need of any legal provisions that may tend to promote the improvement of roads in any and every part of the Old Bay State. We have many fine unoccupied sites for hotels upon the summits of our Massachusetts hills, perhaps overlooking our charming river valleys, which, with shade trees for comfort — but not to intercept views around them — and with good roads to reach them, would afford much attraction. More and better hotels, and better roads, with the attractive scenery which abounds in every part of our Commonwealth, would place Massachusetts where Nature intended she should be, and make her soon become a far greater favorite as a resort for summer visitors from her sister States throughout the country.

Mr. Northrop said the village improvement societies, to which allusions had been made, had done much for our roads. The improvement of public roads is named as one of the aims of many hundreds of these organizations — indeed, in nearly all those in whose formation he had aided. The League of American Wheelmen has also exerted a national influence in the same direction, and the numerous cycling clubs have effectively pushed on this good movement. A few years ago the United States Commissioner of Agriculture said: "The common roads of the United States are much neglected; they are inferior to those of any other civilized country in the world." But great progress has recently been made. In many towns and counties the contrast between the roads of today and those of a dozen years ago is most striking.

Rev. Calvin Terry said that our schools teach reading, spelling, geography, and grammar, with writing and arithmetic — too often by mere rote. But such learning is only a small part of education. What is the object of education? To develop the true manhood and womanhood of the pupils. Children should learn what a glorious world we live in. Yet how few really see what is before their eyes! It makes a great difference whether or not they are taught to think, to see, and to know the trees and flowers, the birds, the fishes, the insects, and all the beautiful things of Nature. A writer in yesterday's paper says, "I saw three varieties of

woodpeckers, this morning," and he met a lad who said, "I saw one, too; a beautiful blue bird with a tuft on its head." He had mistaken a blue-jay for a woodpecker, not knowing the difference. How many of us have seen woodpeckers this week? Children rarely know what they see, because they are not taught to observe closely, and to think. Mr. Terry said he had always loved the birds and the trees, and greatly enjoyed observing them, especially the birds. Before he left his boyhood home he set many trees along the entire front of the home lot — sixty rods. After he went to college cattle destroyed some of these trees, but some of them survived, and are now beautiful specimens of their kinds, and it is a joy to see them — the lindens, the sugar maples, and the soft maples. He hoped this subject would be frequently agitated, and that great good might result from it. Children will learn all that is now taught and more, with greater ease if their minds are expanded by the study of nature. He had heard of a young person, employed as a teacher, who — though trained in the routine style of some schools — taught her pupils that "six times nought is six," and could not be reasoned out of that idea. Are not our children trained in a very narrow world under such a teacher?

Thomas C. Thurlow was in full sympathy with what had been said. He thought that in all country places there should be an intelligent town committee appointed to have charge of the planting of trees in the streets, public squares, and parks. In most cases trees are set too near to buildings, and too near together. The authorities should provide for the protection of such trees from injury by horses. He would have towns and cities authorized to furnish hitching-posts, in order to save the trees. He believed that our children should be taught botany and other branches of natural history, and in a practical way, using the natural objects for study. As it is, botany is not taught even in our high schools nearly as much as it should be. One object of such study in school is to make the pupils take an interest in the study of nature during their walks or rambles in the open air, and to incite them to make excursions for that purpose. He thought it would be a public benefit for towns to secure land, both open and wooded, for town parks, and for wood rambles, as is done in Germany. They afford better opportunities for the study of natural history than would otherwise exist.

Benjamin P. Ware said that it is enough to make one's heart ache

to see trees mutilated by the horses hitched to them. The essayist had given us the best remedy for this evil, for when the people are educated up to his standard, no one will ever use a tree as a hitching-post. The speaker remembered that on the first Arbor Day in Massachusetts, he was moved to propose to a neighbor, who had a row of trees in which there were vacancies, to assist in filling up the row. His services were accepted, and while they were planting the trees, half a dozen of their townsmen came along, and inquired how they happened to be so employed. Arbor Day and its object being explained, some of the party were reminded of vacancies in their tree rows, and at once returned home to restore those lines. Since that time many others in the town, learning of that incident, have been led not only to complete broken rows of trees, but to set trees in new places for the further improvement of their estates. If you can induce persons to plant trees, they will be likely to become interested in protecting them, and also to protect trees planted by others. We have laws enough, but many people are ignorant of their existence, and they are not enforced. But as has been well said, an educated public sentiment is the best protection.

Mr. Terry thought there was a great deal of truth in what Mr. Ware had said. When the speaker bought his present home he planted three sugar maple trees. Lately he found that the beauty of those trees had attracted the attention of his townsmen. Young men came and asked what kind of trees they were, and they too have set some sugar maples. Many others have thereby been led to set maples and other trees, and there is a good prospect that the village will soon be well furnished with ornamental trees.

O. B. Hadwen expressed a deep interest in the paper read here today, and also in the discussion. He had planted many trees, and had lived long enough to see some of them become stately. He would suggest that it is important to make a proper selection as to variety of trees for a particular site; to know that the soil is adapted to grow the tree well, and then set the tree carefully. The rock or sugar maple is very particular as to the soil and position, while the Norway maple will grow almost anywhere.

Mr. French announced that the Forestry Division of the United States Department of Agriculture had issued a pamphlet on Arbor Day, which could be obtained on application.

A motion that the thanks of the Society be tendered to Rev. B. G. Northrop for his valuable and instructive address was unanimously carried.

Mr. Hadwen, as Chairman of the Committee on Publication and Discussion, announced for the next Saturday a lecture entitled "Some Consideration of the Nature and Effects of Heat," by Col. Henry W. Wilson, Boston.

BUSINESS MEETING.

SATURDAY, March 5, 1892.

An adjourned meeting of the Society was holden at eleven o'clock, the President, WILLIAM H. SPOONER, in the chair.

Charles N. Brackett, Chairman of the Committee on the resignation of Patrick Norton as Chairman of the Committee of Arrangements, made a further report, recommending Joseph H. Woodford as a candidate to fill the vacancy on the Committee, and that the Committee be authorized to choose their own Chairman. The report was accepted, and Mr. Woodford was elected to fill the vacancy in the Committee of Arrangements.

The President announced the Committee on Window Gardening, provided for at the last meeting, as follows:

Mrs. Henrietta L. T. Wolcott, *Chairman.*

E. H. Hitchings,	George A. Parker,
Henry L. Clapp,	Miss Mary L. Vinal,
Edmund Hersey,	George E. Davenport.

Leverett M. Chase remarked that only three States in the Union have not yet provided for the observance of an arbor day. He then presented the following preamble and resolutions:

The Massachusetts Horticultural Society respectfully petitions the Legislature of Massachusetts to adopt the following resolution in addition to the resolve relating to the establishment of Arbor Day, approved April 7, 1886, which resolve is as follows:

Resolved, That His Excellency the Governor is requested to set apart in each year the last Saturday in April as Arbor Day, and to issue his proclamation recommending that it be observed by the people of the Commonwealth in the planting of trees, shrubs,

and vines; in the promotion of forest growth and culture; in the adornment of public and private grounds, places, and ways, and in such other efforts and undertakings as should be in harmony with the general character of the day so established.

The proposed additional resolve is as follows:

Resolved, That the Secretary of the Massachusetts Board of Education be authorized and requested to present from time to time in writing a course of exercises on the subjects hereinbefore mentioned, which shall be adopted by the public school authorities, and upon receipt of copies of such course, sufficient in number to supply all schools under their supervision, the school authorities aforesaid shall seasonably provide each school under their charge with a copy, and cause it to be observed on the Friday next preceding Arbor Day.

Voted, That this resolution be transmitted to the Honorable Senate and House of Representatives of Massachusetts by the President and Secretary of this Society.

William C. Strong moved that the resolutions be referred to a committee of five, to be appointed by the Chair. This motion was carried, and the Chair appointed as that Committee, William C. Strong, Leverett M. Chase, J. D. W. French, John C. Hovey, and Henry L. Clapp.

J. D. W. French presented the following resolution, which was also referred to the same Committee:

Resolved, That in the opinion of this Society the study of Natural Science, including Botany, Horticulture, Forestry, and Entomology, should be more generally taught in all the schools of this State, to promote among the children a better knowledge of the natural objects surrounding them, thereby encouraging a greater love for country life.

Charles E. Richardson, Treasurer, presented his Annual Report, which was read by the Secretary, accepted, and referred to the Committee on Publication.

The following-named persons, having been recommended by the Executive Committee for membership in the Society, were, on ballot, duly elected:

JOSEPH WHITNEY, of Cambridgeport,
ARTHUR W. YOUNG, of Hingham,
KENNETH FINLAYSON, of Brookline,
Gen. P. A. COLLINS, of Dorchester.

The Committee, to which the resolutions presented by Messrs. Chase and French were referred, was requested to report to the meeting to be held March 19.

Adjourned to Saturday, March 12.

MEETING FOR DISCUSSION.

Some Considerations upon the Subject of Heat.

By Col. Henry W. Wilson, Boston.

It has been customary for the past twenty-five years to give as an off-hand definition, that heat is a mode of motion. While this is an answer, still it is an evasive one, and unsatisfactory, from the fact that modes of motion in nature are innumerable and variable, from that of a car to that of a comet. Look where we will we see everything in motion, with varied methods and results.

We need not wonder at the difficulty that attends any attempt at a definition of this term, for, possibly, no word in the language has had a greater variety of definition, or, with the development of knowledge and experience, has had greater changes in absolute significance than this word heat.

Our latest cyclopædia-dictionary, the "Century," does not attempt to give a concise statement or definition of the word, but furnishes rather a brief and instructive dissertation on the subject, and leaves the very essence of the matter very much where it always has been, in a mystery.

Webster's Unabridged defines heat as a "force, agent, or principle in nature upon which depends the state of bodies as solid, fluid, or aëriform, and which is recognized by its effects in the phenomena of expansion, fusion, evaporation, etc., and which, as developed from its natural sources, fire, the sun's rays, mechanical action, chemical combination, etc., becomes directly known to us through the sense of feeling."

In the "People's Encyclopædia" of 1882, heat is defined as the "*unknown cause* of the sensation of warmth, and of a multitude of common phenomena in nature and art."

"Appleton's Encyclopædia," 1864, defined heat as "the *name*, both of a certain primary sensation which can be defined only by its synonymes, warmth, calidity, etc., and also of the *unknown*

agency or *cause* that produces the sensation, together with a great variety of phenomena in the material world."

Perry's Dictionary of 1772 defines heat as "the *sensation* caused by the approach or touch of fire."

"Chambers' Encyclopædia" of 1727 says: "Heat may be defined as a *physical being*, whose presence is known, and its degree measured by the expansion of the air or spirit in the thermometer. Heat in us is properly a sensation excited by the action of fire; or it is the effect of fire on our organs of feeling.

"Hence it follows, heat with respect to our sensations, or the effect produced on us by a hot body, is estimated by its relations to the organs of feeling, no object appearing to be hot unless its heat exceeds that of our body; whence the same thing to different persons, or at different times to the same person, shall appear both hot and cold. Heat as it exists in the hot body, or that which constitutes and denominates a body hot and enables it to produce such effects on our organs, is variously considered by philosophers. Some will have it a quality, others a substance, and others only a mechanical effect, viz., motion."

Had the disputative philosophers in the period from 1675 to 1725 paused long enough in their wrangles over the origin and nature of light to discuss the philosophy of heat, they must, in the nature of things, have taken sides, — Huyghens and Hooker maintaining the vibratory or undulatory theory, and Sir Isaac Newton the corpuscular, or the emission of material particles; and it is not a little strange that it did not occur to the contending scholars that heat and light were so associated in their nature and source that they must of necessity be explained in the same manner.

The speculation that heat was a mechanical effect, viz., motion, was first uttered by Sir Francis Bacon in his "Novum Organum," which was published in October, 1620. While introducing much that is speculative and visionary, and evincing a deficiency in good experimental research, Lord Bacon shows much clear insight into the causes of phenomena, which would do credit to the advanced scientific attainments of today, and which, considering the condition of physical knowledge of his time, is quite surprising. The following extracts are from the "Novum Organum," Book 2:

"From the instances taken collectively, as well as singly, the nature whose limit is heat appears to be motion. What we have said with regard to motion must be thus understood, when taken as

the genus of heat; it must not be thought that heat generates motion, or motion heat (though in some respects this be true), but that the very essence of heat, or the substantial self of heat, is motion, and nothing else, limited, however, by certain differences, which we will presently add, after giving some cautions for avoiding ambiguity.

"Laying aside all ambiguity, therefore, we must lastly consider the true differences which limit motion and render it the form of heat.

"The first difference is that heat is an expansive motion by which the body strives to dilate itself and occupy a greater space than before.

"The second difference is a modification of the preceding, namely, that heat is an expansive motion, tending toward the exterior, and at the same time bearing the body upward.

"The third difference is this: that heat is not a uniform expansive motion of the whole, but of the small particles of the body; and this motion being at the same time restrained, repulsed, and reflected, becomes alternating, perpetually hurrying, striving, struggling, and irritated by the repercussion, which is the source of the violence of flame and heat. . . .

"It is also shown by this, that when the air is dilated in the thermometer, uniformly and equably, without any impediment or repulsion, the heat is not perceptible. In confined draughts, also, although they break out very violently, no remarkable heat is perceived, because the motion affects the whole, without any alternating motion in the particles, for which reason try whether flame do not burn more at the side than in the centre.

"The difference of which we now speak is common also to the nature of cold, in which the contracting motion is restrained by the resistance of expansion, as in heat the expansive motion is restrained by the resistance of contraction. Whether, therefore, the particles of matter penetrate inwards or outwards the reasoning is the same, though the power be very different, because we have nothing on earth which is intensely cold.

"From this first vintage the form or true definition of heat (considered relatively to the universe and not to the sense) is briefly this: Heat is an expansive motion, restrained and striving to exert itself on the smaller particles. The expansion is modified by its tendency to rise, though expanding towards the exterior; and the effort is modified by its not being sluggish but active and somewhat violent."

When we consider that the range of physical science was at that time extremely limited, the mercurial thermometer being then unknown; that the composite nature of light and its resolution into the primary colors of the spectrum was not discovered until 1672 or fifty years afterward, by Sir Isaac Newton; that steam as an agent of force or power was not known until the next century, although investigations were being made regarding its mysterious pressure; that Sir William Herschel did not publish his discovery that heat formed a part of the solar spectrum, and that the largest part of the heat rays fell without the spectrum and were therefore obscure, until near the close of his long life, in the early part of the present century, — considering all of these facts as affording some notion of the development of scientific inquiry at that time, these speculations of Bacon seem like the utterances of inspiration. It must be borne in mind that so vague was the conception of the essential elements and relations of matter, that the effect upon the physical system caused by the application or use of pepper and mustard which we all now understand to be simple irritation and nothing more, was then termed "potential heat." In the light of modern experimental research and knowledge we are justified in recasting these definitions somewhat as follows:

Heat is the result of continuous, delicate, minute, and intense vibrations of the molecules of matter which are mainly perceptible to the sense of feeling, and produce in us the sensation of warmth or cold according as the vibrations are more or less intense than those of the body to which they are imparted.

Heat can hardly be called a force, an agent, or a principle, in the strict use of those terms; it is rather a result or an effect, the correlative of sound and the intimate associate of light, with similar characteristics; heat, sound, and light are all modes of motion with different velocities and rates of vibration.

Sound is defined as the sensation or perception of the mind, received through the ear and produced by the impulse or vibrations of the air or other medium with which the ear is in contact.

Light is that impression made upon the organs of sight by delicate vibrations, by which objects from which they proceed are rendered visible. It was formerly regarded as consisting of material particles or corpuscles sent off in all directions from luminous bodies, with the well-known velocity of 192,000 miles per second, but is now generally considered by men of science as

consisting, not in any actual transmission of particles or substance, but as the propagation of vibrations or undulations in a subtle, elastic medium or ether, which is assumed to pervade all space and to be thus set in vibratory motion by the action of luminous bodies as the atmosphere is by sonorous bodies.

The velocity of sound is variable, according to the medium through which it is transmitted, ranging from 1,023 feet per second in the atmosphere, at 60° temperature, to 4,708 feet per second in water, 11,120 feet in brass, 15,590 feet in steel, and 16,360 feet in glass. With gases the velocity is inversely as the squares of the densities, viz.: in carbonic acid gas, 818 feet; in coal gas, 1,636 feet; and in hydrogen gas 3,642 feet per second. This is the rate at which the vibrations or oscillations of the atoms of matter are transmitted from particle to particle through the several media, and is distinct from the rate or number of those vibrations in a given period.

The velocity of light and heat is variously estimated at from 185,000 to 192,000 miles per second, either through space or a perfectly dry atmosphere. The lowest vibration of sound, that is appreciable to the normal sense of hearing, is at the rate of 16 vibrations per second; the lowest musical tone that is agreeable to the ear is at the rate of 32 vibrations per second; the highest tone that is truly musical is at the rate of 4,752 vibrations per second, and the sound of the highest pitch appreciable to the ear is at the rate of 38,000 vibrations per second. There are no vibrations or oscillations of the particles of matter discernible by the human senses from this rate until we reach the enormous and wonderful rapidity of 400,000,000,000,000, or four hundred millions of millions per second, which is about the rate of vibration of the obscure heat rays of the solar spectrum. When the rate reaches four hundred and sixty millions of millions per second the eye perceives the color of the extreme red of the spectrum, and so as the rate increases —

477	millions	of	millions	gives us	the red
506	"	"	"	"	orange
535	"	"	"	"	yellow
577	"	"	"	"	green
622	"	"	"	"	blue
658	"	"	"	"	indigo
699	"	"	"	"	violet
727	"	"	"	"	extra violet

which is the extreme limit of the sensibility of the unaided eye to the vibrations which constitute a ray of light. Beyond this, probably to the extent of eight hundred millions of millions of vibrations per second are the actinic or chemical rays, which are effective in the chemical reactions of matter and are sensible only to chemical compositions or combinations.

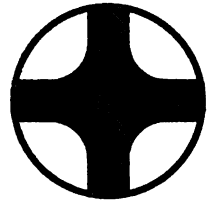
The length of the sound vibrations, or waves, at the rate of 16 per second, is about 64 feet, and at the rate of 38,000 per second, or the highest appreciable sound, the length is one-third of an inch. Beyond this the vibrations of the obscure heat rays, or 400 millions of millions per second, are 34,000 to an inch, which are only sensible to our nervous system. At 460 millions of millions per second they are 39,000 to an inch. They begin to be perceptible to the eye as the red rays at 500 millions of millions per second. At 42,000 to an inch they cease to be perceptible to the nervous system, and at 727 millions of millions per second they are 61,000 to an inch, and cease to be perceptible to the eye as the ultra violet ray.

Thus we can proceed, as it were, through the whole gamut of the motions or vibrations of matter as they affect our senses of hearing, seeing, and feeling.

Never before did the phenomena of heat enter so largely into domestic life or mechanical and commercial operations as they do today. The heating of our dwellings, warehouses, workshops, public buildings, and means of transportation has become an intricate problem, requiring skill and special training to execute and maintain, and with the combined achievements of plumbers, pipe-fitters, electricians, and boiler-makers, with their foibles and hobbies, it is no wonder that the man of modest mien and medium attainments becomes distracted and, in his bewilderment, resigns himself to the inevitable, pays the bills, and vainly resolves not to be so caught again.

Where, two generations ago, the heat required for domestic use was furnished by burning wood in the open fireplace, now we have a multiplicity of coal, gas, kerosene, and electric stoves and ranges, with hot-air furnaces and steam or hot-water boilers to heat the house. The agents and mechanics who furnish the appliances for this service too often manifest the most superficial knowledge of the capacity and properties of the elements which they introduce into our premises, and we are fortunate if we are not the helpless

victims of colossal ignorance. In the case of ignorant or partially informed men there is this singular persistence about them, that you rarely find them willing to be instructed or to be convinced of error. For one instance in my own experience, I was once called in for consultation as to the advisability of making certain alterations in the hot-water pipes of a greenhouse, where the heat was inadequate, and some change was imperative. The maker of the boiler, which, by the way, was of a kind now no longer used or seen, called himself a steam engineer, and he insisted strenuously upon the adoption of his plan, which was to introduce into all of the four-inch pipes, with which the greenhouse was fitted, a core of pottery shaped in transverse section somewhat like a Maltese cross, leaving only four small spaces, or ducts, around it for the circulation of the water. His reason for expecting a benefit from the change was that he had observed that crockery-ware retained the heat for a long time, especially when it was thick; notably in the case of the thick coffee-cups at the restaurants where he had introduced his heaters for coffee and tea.



In opposition to this fancy no considerations or reasoning would in the least avail; his confidence in his superior practical experience could not be shaken. When told that the crockery-ware, or pottery core, would contain only one-half as much heat as the volume of water which it displaced, as he knew nothing of specific heat he ridiculed the idea, and met the statement with his observation that the cup kept the coffee warm. He could not be made to comprehend the fact that if the pipe retained the heat within itself it certainly would impart none to the surrounding air, and would thus fail to heat the house. The suggestion was made that the great reduction of the volume of water in the pipes added to the increased surface would very materially add to the friction, and thus diminish the circulation; but this failed to move him. Finally I insisted, as an ultimatum, that if the use of the pottery core, as proposed, would be so good a thing and an improvement, then the more we had of it the better, and it must be a manifest gain to fill the pipe solid with earthenware, and I should so recommend. This was so manifestly absurd that it served to prevent the introduction of this great improvement.

This is a fair illustration of the persistency in carrying out their

whims by men of limited scientific attainments, who are often entrusted with the execution of important undertakings and the expenditure of large sums of money by people who, from mistaken ideas of the fitness of things, leave the development of their plans until the work is actually begun, and find too often that the evil days are upon them.

Heat in its essence is, always has been, and probably always will be, one of the trinity of mysteries, viz., light, heat, and electricity, that will hardly be resolved this side of the veil. Whether heat and electricity are not convertible terms or effects of the same cause will find those to support and deny; but it is an observed fact that all of the disturbances of the surface of the sun, which is the source of all our heat, are accompanied by electrical manifestations, sometimes of a startling character. It is also within our power to demonstrate that the presence of heat is always manifested by electrical action; but whether one is the cause of the other, and which, or whether they are coördinate functions of the same essential principles, will be debated with equal earnestness on both sides. Be this as it may, personal experience and observation teach mankind that heat to some degree is present in all bodies, and we soon find that personal sensation is too variable and uncertain to be used as a basis of measurement of its relative degree.

It was not until the early part of the seventeenth century that any contrivance was devised for the more definite determination of heat. The Dutch claim the invention for Cornelius Drebble of Alkmaar, in Holland; some Italians claim it for Sanctorius, and others for Galileo, who is said to have invented the thermometer prior to 1597. To whomsoever the honor belongs, it was but a rude contrivance of air and spirit in a glass bulb and tube without graduation, and must necessarily have been far from accurate. Although the astronomer Roemer suggested the substitution of mercury for the spirit and air, it was not till 1720 when Gabriel Daniel Fahrenheit, of Amsterdam, introduced the mercurial thermometer, with a cylindrical bulb, making the basis of the scale 32° below the melting point of ice and snow, which, as it was the lowest temperature observed by him in Iceland in 1709, and corresponded to the temperature produced by mingling snow and sal-ammoniac, was naturally assumed to be the lowest possible temperature. But why he assumed 180° to indicate the range from melting ice to boiling water can never be explained, as he kept the

graduation of his thermometer as a very mysterious secret. Celsius, of Sweden, in 1742 introduced the plan of making the scale 100° between these two points, which has become known as the Centigrade scale.

Heat of all degrees is now capable of being accurately measured by a great variety of combinations of substances, advantage being taken of their known variability of expansion.

The absolute 0 of temperature is estimated to be	460° below 0
Lowest artificial temperature measured	220° below 0
Lowest atmospheric temperature	70° below 0
Estimated temperature of planetary space	58° below 0
Mercury freezes	39° below 0
Water freezes	32° above 0
Water boils	212° above 0
Tin melts	442° above 0
Bismuth melts	506° above 0
Lead melts	600° above 0
Red heat of iron and copper	about 980° above 0
Silver melts	2,283° above 0
Iron melts	3,479° above 0

When we come to study the physical effects of heat we notice —

First. That changes of temperature are accompanied by changes of volume, and by experiment we find that while some bodies expand with each additional increment of heat, but with a ratio varying with the substance and degree of temperature, others contract under the same conditions. Upon this fact is based the construction of all pyrometers as measurers of heat.

Second. Heat is communicated from mass to mass in various ways, whether in contact or separated by space, viz.:

1. By conduction from particle to particle, or atom to atom, without change of place in the mass.

2. By convection or by motion of the particles in the mass, caused by the dilation or mutual repulsion of the particles and consequent change of specific gravity. This effect is mechanical; but in each of these cases the heat vibrations are mutually absorbed and radiated by the different bodies in the presence of each other until the heat is equalized.

3. By radiation.

4. By the converse of radiation, which is absorption.

5. By transmission, where the whole or part of the vibrations of heat pass through an intervening mass, which may be either solid, fluid, or gaseous. This is called Diathermancy.

6. Through space by the agency of an imponderable medium, which is assumed to fill all space, and is called the ether.

Third. Heat is called radiant when it is accompanied by light, as from the sun, or flame, or a glowing body or mass, and obscure when it emanates from a non-luminous body. Both radiant and obscure heat have very marked and distinguishing characteristics.

Fourth. Heat as indicated by the thermometer, while it may serve as a measure of the intensity of the heat vibrations, which we may call the degree of sensible heat in the mass, is not the true measure of the actual or total amount of heat vibrations which the body may contain and be able to impart. This is called the specific heat, and varies greatly with different substances, from water, which has the greatest specific heat of all bodies, to bismuth, lead, and gold, which are very nearly equal, and are about the lowest in specific heat of common substances with which we are familiar.

Fifth. Heat is absorbed, or disappears, during changes of bodies from the solid to the liquid, and from the liquid to the gaseous or aëriform state; it is also thrown out or made apparent again as these conditions are reversed. These variations and manifestations of heat are not accompanied by any change of degree or intensity that is capable of affecting the thermometer, and is called latent heat.

Sixth. Heat accompanies chemical changes, and is given out, often in great volume, when there is chemical combination, and absorbed again whenever there is a disassociation of elements in combination.

Seventh. Heat may result from the operation of mechanical forces, as in the friction of sliding surfaces, by the concussion of moving or falling bodies, or by the resistance to movement of bodies through the magnetic field of either natural or artificial, permanent or electro magnets. Heat so produced is called dynamic heat, and the discussion of the subject under these topics is regarded as the mechanical theory of heat, or the conservation of force, and its production is called the mechanical generation of heat.

The first branch of the subject relates to the effects of heat upon the volume of bodies. Among the changes in the condition of matter wrought by the presence of heat, one that quickly arrests

our attention is the expansion and contraction of different substances by the application or withdrawal of heat. As a rule the application of heat expands and its withdrawal contracts; but to this rule there are some notable exceptions.

The ratio of expansion and contraction is in no case uniform with the increase or diminution of temperature; but most solids continue to expand until they become molten, and with a continued increase of temperature pass into the gaseous state. The existence of any substance known to us in a solid or fluid condition is only a question of the relative degree of heat or, to speak with strictness, the intensity of the heat vibrations that are developed within its mass.

Mercury is only a solid with a low melting point, — 39°, and water is a solid having its melting point 71° higher, or 32° above zero. This phenomenon is so often observed in the affairs of life that we become familiarized with it, and fail to realize its application and significance. We see the electric wires that are strung along our streets one day hanging loosely in festoons from pole to pole and another day strung so taut that the breezes make them hum like a harp of a thousand strings. The change of temperature from a cold day in winter to a hot day in summer will make a difference of one foot and four inches in a mile of iron wire and about three feet in a mile of copper wire; so that one can easily see how a cold snap would haul them taut as harp-strings.

Here are two bulbs partially filled with colored liquid and connected with a tube; the space not filled with liquid is as nearly a vacuum as can be obtained mechanically, and is of course filled with invisible vapor, but free from air. If I hold it with the empty bulb uppermost the heat imparted to the lower bulb, simply by my thumb and forefinger, will generate vapor enough to force the liquid from the lower to the upper bulb and maintain sufficient tension in the vapor remaining in the bulb to hold it there for considerable time; but the tension of vapor becomes speedily reduced when not in the presence of a liquid from which an increased supply can be obtained, and so the force of gravity slowly asserts itself and the liquid gradually returns to the lower bulb to repeat the process as long as a limited amount of heat only shall be imparted to the bulb; but let me grasp the lower bulb in my hand so as to completely envelop it, and the heat of the hand is so copiously imparted to the liquid that it is rapidly forced upwards and

the expansion of the remaining vapor will maintain a constant and violent ebullition which the force of gravity is unable to overcome.

In all large structures, where the material is united into one continuous mass, careful attention must be given in the construction to allow for the expansion and contraction from heat and cold to expend itself without resistance; otherwise the material might be disrupted and the structure destroyed. The great Britannia tubular bridge, across the Menai straits in Wales, built by Robert Stephenson in 1848, is an immense hollow continuous girder 1,380 feet in length, and the extremes of expansion and contraction from summer to winter amount to fully thirteen inches.

The cables of the Brooklyn bridge are 3,578 feet in length from anchorage to anchorage, and the limit of expansion and contraction from heat and cold is about four feet; as one-half of the cables is suspended between the towers, in the main span, this movement is so distributed that no disturbance is occasioned in the seats of the cables in the saddles upon the towers, but the contraction of the central portion will raise the centre of the bridge nearly four feet. That there is a serious movement in all masses of material exposed to the elements and which ultimately contributes to their overthrow, was shown in an interesting manner some forty years ago, when, for the purpose of illustrating the rotation of the earth by the oscillations of the pendulum, a plummet was suspended in the central shaft of the Bunker Hill monument. Not only was the object sought clearly demonstrated, but it was also shown that the shaft itself oscillated back and forth once every day, which was caused by the heat of the sun shining on one face in the morning and the other in the afternoon. The range of this vibration, in a warm summer's day, was, if my memory serves me, about seven-eighths of an inch.

There are, however, some striking exceptions to the general rule that heat expands and cold contracts.

Water between 32° and 212° Fahr. expands 0.003745, or $\frac{1}{267}$ of its volume; in cooling it forms a notable exception to the rules which seem to govern other bodies; from the temperature of 212° it regularly diminishes 0.000247 in volume for each degree of heat that it loses until it reaches the temperature of 39.4° Fahr., at which temperature it is of the maximum density; from this point it expands as it cools until it reaches 32°, when, if there is no resistance by way of external pressure or the presence of saline

impurities, a sudden crystallization into ice takes place, accompanied by a rapid evolution of heat and great expansion, hitherto unequalled, amounting to about ten per cent: the specific gravity of ice being 0.9178 and one volume of water at 32° giving 1.102 to 1.0893 volumes of ice of the same temperature, and the heat given out amounts to one-half of the heat contained in the water. This expansion is also accompanied with a marvellous exhibition of force; in domestic life we see vessels of wood, glass, and iron rent asunder by this expansion of ice. In nature, rocks are cleft in twain, and masses of earth and stone are hurled from cliffs and mountain peaks by this irresistible agent. The freezing of water has been the great disintegrating force of nature which has rendered the earth a fitting habitation for man. The geological changes wrought by ice are among the most notable as they are most recent, and without them many of the characteristics of soil and climate which adapt the temperate zones for the residence of man would not have existed. Water will neither freeze nor expand into steam if it can be subjected to sufficient pressure. A stout cast-iron shell, thirteen inches in diameter, was filled with water, a bit of iron was introduced into it, and then the orifice was closed with a solid plug; after being subjected to a temperature of —40°, the shell was shaken and the rattle of the piece of iron clearly showed that the water still remained in a liquid state; the plug was then suddenly forced out when a solid plug of ice 8 inches in length rapidly protruded from the opening, showing that the water froze as fast as it was expelled by the pressure. On the other hand water heated to a high temperature under great pressure remains liquid until the pressure is removed by explosion or otherwise, when it quickly flashes into steam.

A question, which at times has given rise to a good deal of speculation, is whether the earth is not gradually losing its heat, or rather radiating into space more than it receives from the sun, and whether as it gradually cools it will, in the process of time, become, like the moon, a dead planet. Reasoning from the nature of things, this seems to be reasonable enough, and, as we understand that it is an attribute of matter that its heat shall be uniformly distributed, and therefore equalized, it becomes an interesting and intricate problem to determine just what the mean heat of the universe, to which we shall all finally be reduced, may be. If we may judge or assume from the visible effects of heat upon terres-

trial things, we may clearly ascertain by computation that the diminution of the heat of the earth, by one degree only, would cause a sufficient contraction of its mass to accelerate its diurnal rotation by 6 minutes 48 seconds of arc, or 0.43 of a second of time, in one day, making the day so much shorter; this would increase the apparent length of the year by 2 minutes 37.7 seconds, which would make a day in 550 years. By the Gregorian calendar we drop one leap-year in 400 years to correct the irregularity of one day in that time. These periods are so large as to be quickly noted in astronomical observations, but as there has been not the slightest variation of the length of the day or year since the use of precise instruments and careful observations, say since the time of the royal astronomer Bradley, who was appointed in 1742, 150 years ago, and as Laplace was able to affirm, as the result of his computations, that the year was thirteen seconds shorter in his time than it was in the time of Hipparchus, about 150 years before the Christian era, or a lapse of 1,950 years, we may safely conclude that the impending torpidity of the earth, while it may be an interesting phenomenon when it shall occur, will not happen in time to affect the ice crop of the present generation, and we may therefore freely confine our thermal speculations to the meteorological changes, and to the vagaries of the Gulf stream.

Bismuth among metals exhibits the same peculiarities that water does among liquids. We have here a fusible alloy composed of tin, lead, cadmium, and bismuth. Although bismuth does not melt under 500°, lead at 612°, and tin at 442°, the alloy made by mixing them melts readily in boiling water, which is only an illustration of the well-known fact that metallic alloys yield more readily to heat than do either of the metals separately. This alloy has been immersed in boiling water and you can readily perceive that it is in a molten state. I pour it into this test tube in contact with hot water; the thermometer shows it to be 160°, and, as it cools, the alloy will expand while the glass contracts and becomes fractured. Here is one already cooled, which clearly shows what will happen to this other one later on.

Here is a small copper ingot having two slight ridges, one on each side, with a handle to enable me to manipulate it. It has been heated to about 400° temperature. Upon placing it on this small billet of lead it begins to vibrate from side to side so rapidly as to be clearly audible by its singing sound, which some of the audience

by attentive listening may hear. The explanation of this phenomenon is simple enough: the copper is an excellent conductor, and parts with its heat freely; the lead is a poor conductor, and when the copper touches it a small protuberance is caused by the sudden expansion of the lead by the heat which its poor conductivity finds it difficult to carry away fast enough. This small protuberance causes the copper to tilt and the other ridge strikes the lead with a repetition of the same experience, and so the copper vibrates back and forth till the two metals become nearly equal in temperature. This experiment was first made by Sir Arthur Trevelyan, nearly seventy years ago, and created a good deal of discussion among the scientific men of that time. For perfect success it requires the combination of a good and a poor conductor of heat.

If we take a metallic rod and apply very slight heat to it it becomes elongated. Many of the automatic fire-detectors depend upon this principle to close an electric circuit which springs an alarm. The metal covering of a large roof, when very steep, has often been expanded by heat to that extent that the cohesive force of the metal was inadequate to restore it to its former position and it became disrupted and useless.

Molten iron, and most likely other metals, expand just at the moment of crystallization, as water does in forming ice, and thus cold iron floats on the molten metal.

These experiments are shown, not with the view of illustrating any new principle or an old one in a novel manner, but that the ocular demonstration of the fact may the more readily impress the mind.

The second important characteristic of matter in its relation to heat is in the power of conduction. Through some substances the vibrations of heat pass with freedom and celerity, while in others it is with great slowness and resistance.

A satisfactory illustration of the relative conducting power of copper and iron is afforded by two rods having, at intervals of about an inch, small spurs inserted, to which small wooden balls are fastened with wax. Beneath the point of contact of the two rods we place this alcohol lamp. The vibrations of heat soon begin to pass along from atom to atom; first a ball drops from the copper rod, perhaps the next one may fall from the iron rod, but, after that, they will be loosened with great regularity a little more than twice as fast from the copper rod as they are from the iron one. This gives us a visible illustration of the fact that copper

conducts heat about two and a half times better than iron; in other words two and a half times as much heat will pass through copper as iron in the same time, other conditions being similar. This leads to the question whether, as such is the undoubted fact, it would not be economy to introduce copper boilers and pipes to heat greenhouses. My own experience leads me to think that it would, and I am not sure that the original cost of the copper outfit would greatly exceed that of iron; there would certainly be a great gain in fuel, labor, compactness, tidiness, and satisfaction. Next to the inherent quality of the metal, the amount of heat passing through it is proportional to the thickness. For the cast-iron shell of the ordinary greenhouse boiler about three-eighths of an inch thick, may be substituted a copper sheet less than one-sixteenth of an inch in thickness; for cast or wrought iron pipes from three-sixteenths to one-quarter of an inch may be substituted copper pipes of one thirty-second of an inch in thickness, the whole outfit being lighter, handier of adjustment, and more easily moved in case of alterations, and withal quicker in operation. Another difficulty with iron pipes escapes criticism because it is unseen. From the first introduction of water into the pipes and boiler they begin to rust; if you use a wrought-iron pipe the difficulty is aggravated, because wrought-iron rusts more rapidly than cast-iron, and the interior of the whole apparatus becomes speedily coated with a substance for a lining which is far more impervious to heat than the metal itself. Add to these considerations the fact that with copper your fixtures would have a much greater value if from any cause or change you desire to break up or alter your heating arrangements, and we can easily see that copper is more desirable to use than iron.

I have prepared a piece of apparatus to illustrate the small conductivity of water, but time will not admit of its introduction, nor is it necessary to impress upon you the fact that water is a poor conductor of heat, for most of you have a permanent illustration of it in your houses. A modern dwelling is not complete without hot-water fixtures; as an attachment to the range is a long copper tank or reservoir erroneously called a boiler; two pipes connect the tank with the water jacket or lining of the range; the upper pipe is the flow-pipe and the lower one is the return; this is connected at some little distance from the bottom of the tank. When the water in the tank is so hot near the top and even down

to the flow-pipe that the hand cannot be borne upon it, the bottom of the tank even within a short distance of the return pipe will be quite cool and remain so until heated by the shell of the tank; the conductivity of water is only one ninety-fifth of that of pure copper.

Dry air is also a very poor conductor of heat, and therefore all substances in a porous condition have far less conducting power than when solid, because of the spaces between the various particles which are filled with air. We fill the walls of an ice-house with tan bark and sawdust; we double our windows to avail ourselves of the intervening space to aid, by the non-conductivity of the air, in retaining the heat of the room, which is the equivalent of excluding the cold.

We find that the warmth of our clothing consists not merely in its weight or thickness, but in its downy porosity, which is more conducive to health; feltings and fleecy flannels of wool are more serviceable as coverings than heavier woven fabrics, especially of cotton. Iron is a fair conductor of heat, but when in the form of slag, which is a silicate of iron, it is spun out into a flossy fibre and made into a felting, it becomes an excellent non-conductor for covering boilers, steam-pipes, etc. Here is a piece of the slag, heavy, dense, and cold; here also is a handful of the flossy fibre called mineral wool, light in color as well as weight, and feeling warm to the hand, as it is an excellent non-conductor. They are identical in composition. Pure silica, in the form of a solid crystal has about the conductivity of lead, — say about one-fourth that of copper or one-sixth that of pure silver; but if we take it in the form of sand we find that heat moves through it so slowly that a very thin covering will serve to retain or exclude the heat for a very long time, its conductivity being 200 times less than that of copper. If we take the silica in the form of what is called infusorial earth, which is but the mineral remains or spiculæ of pre-glacial vegetation, and is sold under the name of tripoli powder for polishing metals, and under the name of fossil meal as a non-conducting material for coating boilers and pipes, we have one of the best of non-conductors, — nearly equal to asbestos. Here is a specimen of this mineral which I took from a section of a hydraulic mine in California, fourteen years ago; it was from a deposit at least 50 feet in thickness and 100 feet below the surface of the hill, 4,200 feet above the level of the sea, and 2,000 feet above the river in the cañon

within two miles. It is very light and compact. Here is a specimen of asbestos felting, which is a favorite material for coating boiler-pipes where heat is to be retained.

The efficiency of a coating of non-conducting material for the conservation of heat is manifested in a striking manner by the Norwegian cooking arrangement for the preparation of food. A metallic can is surrounded by a thick felt jacket, which in turn is enclosed in a wooden box. The utensil is filled with boiling water, in which the food to be cooked is placed, and then closed; long before the water is cooled the food is perfectly cooked, and with an economy of fuel which fills one with wonder that it is not generally used; in a properly constructed "stove," as it is called, the loss of heat is only about five per cent per hour.

Boilers and conducting pipes which are not intended to radiate heat, should be covered with an adequate coating of mineral wool, diatomaceous or infusorial earth, or asbestos felt, and well whitewashed instead of painting the naked metal surface, as is usually done with black paint; the saving of heat, and therefore of fuel, would be quite material, besides the great gain in the comfort of the boiler-room.

The degree of conductivity of different substances has a sensible effect upon the sensation of heat or cold produced on our bodies. When we approach or touch that which has a higher or lower temperature than our body, the degree of conductivity increases the sensation either of heat or cold. Copper will burn the flesh at a lower temperature than iron, iron than pure tin, tin than lead, lead than marble, and marble than brick, because each will impart a greater or less quantity of heat to the flesh in a given time. Copper at 120° will burn the flesh, while water will not scald at 150°, because the heat in the atoms of water in immediate contact with the person is given out or absorbed, and as the adjacent particles communicate their heat more slowly it is conducted away and dissipated in the system faster than it can be imparted; while metals, owing to their greater conductivity, continue to pour their heat into the flesh which is in contact with them faster than it can be absorbed or conducted away, and the destruction of the tissues in immediate contact is the result.

Density is not always a criterion of conductivity. In the case of woods, American white birch, which is one of the lightest of woods, having a specific gravity of 0.567, stands highest as a con-

ductor; iron or Brazil wood, having a density from twice to three times that of birch, is only about one-fourth as good as a conductor, and mahogany with twice the density has only two-thirds of the conductivity. Woods may be classed, however, as non-conductors, white birch having only 0.41 of the conductivity of silver.

Whereas metals conduct heat and electricity with the same relative facility, the ratio of the conducting power of wood is about the same as its permeability to moisture. The transmission of heat through wood is parallel with the fibre or lengthwise of the grain, and varies from 0.41 to 0.26; perpendicular to the fibre and parallel with the ligneous layers the transmission varies from 0.10 in the case of white birch to 0.13 in mahogany, so that the transmission of heat through a plate of silver is about seven hundred times greater than it is through a plate of white birch cut perpendicular to the fibre and parallel with the ligneous layers. This is the line of greatest resistance to the transmission of heat, and is the plane sought in the cutting of staves for barrels where the greatest impermeability to liquids is desired.

Most liquids and all gases being poor conductors they transport what heat they do absorb — and some of them have great powers of absorption — by the circulation of the heated particles through the mass by a purely mechanical movement which we call convection. This is the action of boiling water, with which we are all familiar, and by it heat may be conveyed a long distance through well arranged pipes. Steam being of lighter specific gravity, while it has a proportionately less capacity for heat, is more mobile and flows more readily than water, and the intensity of its heat must of course be several degrees higher than water can be raised in pipes. Air, while a poor conductor, will contain a limited amount of heat, which is increased in proportion to the amount of moisture with which it is charged.

If air is charged with moisture, say approximately to the dew-point, its capacity for heat is increased threefold, and we experience discomfort from it in two ways: when the temperature of the atmosphere is at from 35° to 40°, and snow and ice are thawing, the air is loaded with moisture so that it is clearly visible, and its heat is being rapidly absorbed by the melting ice; then it is that we need to be most careful as to our clothing, for wherever the air finds free access to the body it quickly robs it of its heat and we feel a chill, cutting, as we sometimes say, "to the marrow."

There is at least one-half more danger of serious effects from cold when the thermometer is from 35° to 40°, and the air is filled with vapor, than there is at zero with the air as dry as it generally is at that temperature, simply for the reason that the moisture of the atmosphere gives it increased power to rob us of our heat and conduct it away. So it is that the air of our houses can be more easily heated by our furnaces if it is moist than if it is dry. I have seen the dry, cold air from out-of-doors pass through a glowing furnace without becoming heated sufficiently to be sensible to the hand, and if the hand was moistened it would impart a marked sensation of cold, owing to the rapid evaporation; this was because the air was so dry and cold that in its rapid passage through the furnace it was not able to absorb enough heat to exceed the temperature of the blood, and thus be sensible as heat to the sense of feeling. If we have one superstition that is greater than another, and working mischief all the time, it is that the cold-air box of the furnace should open out on the coldest side of the house. After much expense and experiment I cut mine off entirely twenty-two years ago, and connected it with the interior of the house, with the result that there is no more shrunken wood-work, no dry and parched flesh, no absorption of the moisture of the throat and lungs, causing constant irritation and desire to cough. Before I made the change I could actually heat my rooms more perfectly with the window open than I could with it shut; this was when the doors were closed in the evening, and the weather very cold. Applying the same principle to the heating of a church which never had been made comfortable in very cold weather, the putting on of rubber mouldings around the windows increased the difficulty, as it made the building tighter and made it more difficult for the hot air to force its way up and displace the cold air in the building. I undertook to heat the building better with one furnace than the janitor could with two, and succeeded to the satisfaction of the committee.

We shall never succeed in heating a room by applying heat to the top, although a greenhouse may be well heated by placing steam-pipes near to the glass; neither should we expect to ventilate our rooms in the best manner by connecting our ventilating arrangements solely with the bottom of the room. By the first effect of heat which we have considered, the air becomes expanded, and thus is rendered specifically lighter, and the movement is

upward from the radiating point as a centre, while the return currents are along the exterior walls of the room from the top downward till the circuit is completed. Anything that obstructs the currents from separating and taking well-defined paths, retards the heating or the ventilation of the room, and whatever will enable each current to take a distinct course will facilitate those results. This is the principle underlying all ventilation. Here we have a glass jar with a long projecting top, which is open. It would seem that the opening would be adequate to permit the admission of sufficient air to support the combustion of this bit of candle; if there were an opening in the ceiling of this hall relatively as large, it would be about twelve feet in diameter. Upon lighting the candle and placing over it the receiver, we see that the flame soon begins to wane, and will expire unless we are sufficiently adroit to introduce this strip of brass in the opening, to enable the upward current of heated air, exhausted of its oxygen, to ascend without being obstructed by friction and interference in mingling with the descending current of cooler air which seeks to take its place; if we insert the plate soon enough, the flame will revive and burn with freedom and brightness. This essential principle of all natural ventilation must also be respected when artificial or forced ventilation is resorted to, if the most successful results are to be attained.

Transmission of Heat by Convection.— If we apply heat to the bottom of a glass jar filled with water in which particles of sawdust have been placed, we shall easily perceive the movement of the upward current in the centre, and the descending currents along the sides. This is the principle by which all heating by means of hot water is accomplished. Water can never be heated from the top, but the effect of the heat of the boiler is to cause the water contained in it to expand, and thus become specifically lighter than the water which fills the circulating pipes, and tend to rise, and its place is occupied by the cooler water from the pipes. We have thus the direct intimation of the correct adjustment of our pipes for the most perfect circulation; that the flow-pipe should at first start upward from the boiler, and then ascend regularly until the extreme point of the circulation is reached; from this point the grade of the return pipes need not be so regular, and they may even be made to pass depressions lower than the boiler without difficulty. At the summit or extremity of the cir-

culating pipes is the point to place the tank which is to contain the excess of volume caused by the expansion of the water, and therefore called the expansion tank. You have before you a model of the boiler and pipes of a greenhouse made of glass, so that the movement of the water and the consequent transmission of heat is quite apparent. By placing a little carmine ink in the boiler and expansion tank, you can see very readily, as the spirit lamp is placed beneath the boiler, that the movement of the colored or heated water upward and outward into the flow-pipe is simultaneous with a corresponding movement of the colored water of the expansion tank into the return pipe toward the boiler; and not until the colored water from the boiler reaches the extremity of the circulation at the tank does the thermometer show any sensible rise of temperature.

In a variation of this plan of construction, so as to provide for the conduct of the flow to its full height into the expansion tank at the boiler, and its subsequent descent into the circulating pipes, as is done in the hot-water car-heater, while, from the necessity of conducting all of the heating pipes below the level of the boiler, it may be imperative so to arrange the pipes, yet careful comparative tests have clearly shown that the circulation is not so quick, and the consequent transmission of heat is not so effectual as where, as in the case of the model, the boiler is placed below the entire length of the flow-pipe, and the extreme end of the circulation is at the highest point. Circumstances may arise when it will be required to carry all of the pipes beneath openings or floors which are lower than the boiler; in such cases there will be no alternative but to adopt the second plan, but it must be at a loss of time in heating the house, and an increased expenditure of coal to maintain an equal temperature.

While speaking of radiation, the lecturer mentioned being asked by a greenhouse man how to keep his boiler-room cool; and he suggested that all the exposed surfaces of the hot-water apparatus in that room, which were coated with black paint — a good radiator — be covered with asbestos, which should then be coated with pure lime wash. By this method he saved twenty-five per cent of heat, which had hitherto gone to waste.

Again, the copper boiler connected with a kitchen range radiated too much heat. This was remedied by polishing the exposed surface of the boiler, which previously, in its tarnished condition, radiated heat with greater freedom.

The lecturer held the close attention of the audience to the end, and a vote of thanks was unanimously accorded to him for his very interesting, instructive, and valuable paper.

It was announced that on the next Saturday William E. Endicott, of Canton, Chairman of the Library Committee, would read a paper on "The Society's Library."

BUSINESS MEETING.

SATURDAY, March 12, 1892.

An adjourned meeting of the Society was holden at eleven o'clock, the President, WILLIAM H. SPOONER, in the chair.

William C. Strong, Chairman of the Committee to which were referred the resolutions presented at the last meeting by L. M. Chase and J. D. W. French, reported the former so amended as to read as follows:

"*Resolved*, That the Massachusetts Horticultural Society respectfully petitions the Board of Education of the Commonwealth that a printed course of exercises, which in its opinion may be suitable for Arbor Day, be prepared, which shall be recommended by the public school authorities, and upon receipt of copies of such course sufficient in number to supply all schools under their supervision, the school authorities aforesaid shall seasonably distribute a copy to each school under their charge, and cause it to be observed on Arbor Day or the Friday afternoon preceding Arbor Day."

The Committee recommended the passage of this resolution, and also of the resolution offered by Mr. French, as follows:

"*Resolved*, That in the opinion of this Society, the study of Natural Science, including Botany, Horticulture, Forestry, and Entomology, should be more generally taught in all the schools of the State, to promote among the children a better knowledge of the natural objects surrounding them, thereby encouraging a greater love for country life."

The Committee further recommended that a copy of these resolutions, signed by the President and Secretary, be transmitted to the Board of Education.

The report of the Committee was accepted, and the resolutions were adopted.

Charles N. Brackett, Chairman of the Committee on the Vacancy in the Committee of Arrangements, reported that the latter Committee had unanimously elected Joseph H. Woodford Chairman.

The Secretary read a letter from Edmund M. Wood, offering two silver cups of the value of one hundred dollars and seventy-five dollars, to be awarded as prizes for the best and second best twenty-four blooms of the Waban Rose, at the coming Spring Exhibition, on the 22d to the 25th of the present month. It was unanimously voted that the offer be accepted, and that the thanks of the Society be presented to Mr. Wood therefor.

Adjourned to Saturday, March 19.

MEETING FOR DISCUSSION.

The Library of the Massachusetts Horticultural Society.

By William E. Endicott, Chairman of the Library Committee, Canton.

The best essay upon the Library would be a simple list of the books, a perusal of which would show in the clearest way the exceedingly valuable character of our collection. Something more condensed appears preferable, however, at this time.

I have taken some pains to ascertain what rank the Library holds among those of its class, and as the result of my inquiries can now state with great pride as well as satisfaction that it is one of the foremost five in the world, while its collection of purely horticultural works is by far the finest in existence.

A donation of books from Robert Manning, one of the founders of the Society (the father of our present librarian), was the beginning of this library, but that we have been able to purchase the greater part of these books is due mainly to a seemingly trivial circumstance. About fifty years ago, when the dahlia was more extensively cultivated and exhibited than at present, Mr. Josiah Stickney, a merchant of Boston, happened to enter the hall where a fine collection of these flowers was displayed, and was so much impressed by their beauty that he became a cultivator of these and other plants. His enthusiasm grew as his collections increased,

until, finding that his grounds in Boston would hold no more, he bought an estate in Watertown large enough to give his gardening tastes sufficient room.

In process of time he became President of this Society, and, some time before his death, established a fund for the purchase of books upon Horticulture, Botany, and allied subjects. This fund, which became available in 1869, has yielded a yearly income of seven hundred dollars. Our interest in it was limited to thirty years, so that we shall have the benefit of it only seven years more, and then it reverts to Harvard College. The four thousand nine hundred dollars still to be derived from it will probably suffice to buy the greater part of the costly works now existing which we still lack, but new works of high price are constantly appearing, and in 1900 we shall still be able to use seven hundred dollars a year to advantage. It is greatly to be hoped, therefore, that Mr. Stickney may have a worthy successor.

But, though the greater part of our books are marked as from the Stickney Fund, the Library owes at least as much to the appropriations made by the Society from year to year. A great collection of men, without enrolment, organization, and discipline, is not an army; and a collection of books, however numerous, rare, or costly, is not a library until it is catalogued and arranged, and provided with a convenient and commodious lodging and a librarian. All of these have been provided by the Society, as well as all our magazines and papers; for the Stickney Fund was limited by the donor to the purchase of books.

The last printed Catalogue was issued in 1873. The titles of books and pamphlets acquired since that date have been printed yearly in connection with the report of the Library Committee, but a Catalogue of a different nature has long been needed. A Card Catalogue, such as is in use in most libraries of importance, was suggested in the report of the Library Committee in 1876, but it was not found practicable to make one for many years; we are glad to say that such a Catalogue, sufficient for present purposes, is now nearly finished, and may be found in the drawers to the left of the southern entrance to the Library Room.

Several years ago it became evident that a catalogue of our plates of plants, fruits, flowers, etc., was needed. When the subject was first broached the number of these plates was estimated at two hundred and fifty thousand, of which it was thought that

Pritzel's well-known Index gave the location of less than one-half. A catalogue has been for some time in preparation, and I am of opinion that the estimate first made was not far wrong, for over eighty-six thousand figures not in Pritzel's list have been found, and the work is by no means completed.

To enhance the usefulness of the Library another very important instrument is lacking: an index of subjects. Hardly a flower or fruit or vegetable, hardly a method of heating or mode of propagation or manner of cultivation known since horticulture began in Europe, is unnoticed in our books or periodicals. When an entire work is devoted to one subject, a cross-reference in the first-mentioned catalogue would be sufficient; but for detached articles in other books, we can only look in each index separately — a process so tedious as to be practically useless. How valuable, for instance, would be a ready reference to the new plants which have been described in the "Gardeners' Chronicle," or to the descriptions of each year's novelties which several of the gardening papers publish every January. We have sets more or less complete of the reports of fifty Experiment Stations in the United States, many of them of very great value; but we cannot make half use of them until we have an index of subjects. These are but hints of what such an index would do for us.

Especial mention should be made here of two valuable donations to the Library, a bequest from the late Professor Russell of about five hundred botanical books and pamphlets, and a large number from the family of the late Charles M. Hovey. We have not far from six thousand three hundred books and six thousand pamphlets. This is, of course, an estimate; the last actual count, as far as I am aware, was in 1890.

Our collection of botanical and gardening periodicals, though not complete, is very rich, both in such as have run their course and in those which are still issued. A list of such is given in the "Gardeners' Chronicle" of January 23 of this year. We take fourteen out of nineteen English ones on its list, nine out of ten American, besides a good many not named, four out of six Belgian, four out of nine French, several Austrian and German, and one each from Ceylon, British Guiana, Italy, Java, Uruguay, and the Argentine Confederation. Of most of these our sets are complete up to the present time.

To decide which one is best among many of great excellence

would be very difficult; moreover, there might be a difference of opinion. I shall, therefore, make no attempt to rank any one of those I mention above another. That the "Gardeners' Chronicle" is exceedingly valuable all will admit. One of its best features is its notices of new plants, which the highest authorities, such as J. G. Baker, R. A. Rolfe, and until recently H. G. Reichenbach, have described and named. These descriptions are frequently accompanied by very clear and careful wood-cuts. Its notices of new horticultural and botanical books are also numerous, and the Library Committee find them valuable as hints and reminders in the discharge of their duties. The "Chronicle" has frequent articles upon the beautiful mansions and castles of England, in which it gives prominence not only to the horticultural attractions of the places described, but also to points of historical interest. The seven numbers which have reached me since January 1 contain six such articles, all of much value. Most of these are illustrated with views of the buildings and grounds, showing what can be done when unlimited means are employed and almost unlimited time, as in the case of Burleigh House, built by William Cecil, Queen Elizabeth's Lord High Treasurer, or of Warwick Castle, part of which was in existence before the Norman Conquest.

"The Garden," now in its forty-first volume, is probably more read by our members than any other English periodical. Its editor, whose practical works on horticulture are very original and valuable, has very decided views, and expresses them often in terms whose clearness is more striking than their suavity; but his forcible and clear-headed sway keeps the paper in a definite line which has won for it a wide popularity. Botanical science must not be looked for to any great extent in "The Garden," but it is full of horticultural science of the best kind. The colored plates which it publishes weekly are sometimes indistinct, but are generally good; their subjects are sometimes species of plants as found wild, sometimes varieties which have originated in gardens, but always of horticultural value.

Of the "Botanical Magazine," also, we have a complete set. This is the oldest periodical of all; it has been published monthly for one hundred and four years, and is still as fresh and vigorous as ever. Though it issues many plates which have little garden value, the history of gardening during the last century can easily be traced

in its pages. For many years from the beginning, portraits of Cape of Good Hope bulbs and other plants are very numerous. Later we find Banksias, Melaleucas, Kennedyas, Hoveas, and the like; then Mexican bulbs and Cacti appear on the scene, and some of the Andean Begonias, whose progeny are now so numerous and so astonishing, and finally the reign of the Orchid is made manifest by the prominence of that order in the illustrations. About fifteen years after its commencement its subscription list fell off very much, and it was almost on the point of abandonment; for this reason the numbers for several years of the beginning of the century are scarce, and broken sets are more common than full ones.

The "Botanical Register" began in 1815; our set of it is complete. It is very rich in figures of bulbous plants, reflecting the tastes and interests of the Hon. and Rev. William H. Herbert, whose articles are very interesting, and whose record of his labors in cross-fertilizing gladioli, crinums, and other plants of the iris and amaryllis families, is a valuable guide to hybridizers at the present day.

The "Flore des Serres" was founded by Louis van Houtte, the famous proprietor of the Royal Nurseries of Ghent, and edited by him until his death, when it came to an end. It consists of twenty-three volumes, all of which we have. Its articles are valuable and varied, but its special point of interest is in the portraits of the editor's hybrid Plectopomas, Tydæas, Nægelias, and other gesneraceous plants, and of his beautiful seedling Hippeastrums of the Vittata type.

The "Belgique Horticole," our set of which is complete, consists of thirty-five volumes. It was edited by Professor Morren and came to an end at his death. It is largely an account, illustrated with carefully prepared plates, of the editor's collection of bromeliaceous plants, a family which deserves extensive cultivation, and as such it is exceedingly valuable.

The great development of the fancy for orchids has led to the establishment of a number of periodicals devoted to illustrations of them, accompanied by cultural and botanical matter. The "Orchid Album" and "Reichenbachia," published in England, and "Lindenia" in Belgium, are full of exceedingly beautiful plates, which render, I think, full justice to the plants whose names they bear, though I am not of opinion that there are very many exaggerations.

The "Gartenflora," edited formerly by Dr. Regel and now by Professor Wittmack, is a serial which we ought to be glad to own. It is not often found in perfect sets, but we are so fortunate as to have all of the volumes. The "Gartenflora" by force of circumstances has been foremost in depicting new plants from Western Asia, species of Tulip, Fritillaria, Allium, and others, and is especially valuable on that account.

The "Tropical Agriculturist," published at Colombo, Ceylon, is a most complete monthly treatise on everything implied by its name, and though, for the greater part, it is not of what is called "practical" use to us, we can hardly imagine any one so devoted to the dollar as to feel no interest in the varied pursuits of far Eastern cultivators.

"Timehri," the publication of the Agricultural and Commercial Society of British Guiana, gives frequent articles upon the aspects of vegetable life in that colony, which are generally of much interest.

These are a few only of the periodicals our Library possesses. The Library Committee will continue to add to their number as occasion presents itself; for such works give the history of the progress of horticulture more completely, and follow its changes more closely, than books can do. The same is true to a certain extent of tree, plant, and seed catalogues, of which we have a large and valuable collection from nearly every country where dealers exist. We should be very glad if we could secure the lists of every person in the business, and if these words shall come under the eye of any person who issues a catalogue and does not send a copy to our Library, I hope he will construe them as an earnest request to put the Massachusetts Horticultural Society upon his mailing-list.

Of the books this Library contains, apart from periodicals, it is difficult to speak as the subject deserves. The number of volumes which demand notice for their age, rarity, beauty, costliness, or intrinsic value is so great as to bewilder and amaze any one who shall attempt to select all the noteworthy ones. I shall therefore follow a course undetermined by any fixed principle, being sure that not a shelf can be touched which will not furnish a subject worthy of comment.

The "Flora Græca," of Dr. John Sibthorp and James Edward Smith, is a very sumptuous work, and by far the most costly in our Library; for the expense of its production was no less than one

hundred and fifty thousand dollars, which was defrayed from the proceeds of an estate left by Dr. Sibthorp for the purpose. As only thirty copies were sold, each cost the estate five thousand dollars. A second issue of forty copies was made about 1840. Ours is one of the first set. This splendid work is in ten large volumes, and contains nearly one thousand figures of the plants of the Grecian peninsula and islands, in their natural size and colors. It would be difficult to speak too highly of these magnificent volumes, nor can I believe that any person, however indifferent to botany or uninterested in plants and flowers, could look upon these superb plates without delight.

If the "Flora Græca" was most expensive to produce, the "Flora Danica" is, in some respects, the most remarkable. It is a very extensive work, consisting of eighteen large volumes, containing three thousand two hundred and forty colored plates. The first fasciculus appeared in 1761. Its title page announced that it was to contain portraits of the plants which grow in the kingdoms of Denmark, Norway, and Sweden, the duchies of Sleswick and Holstein, and the seigniories of Oldenburg and Delmenhorst. The work was completed in 1883, one hundred and twenty-two years from its beginning. For four generations the work was steadily pursued, in spite of the encroachments and reverses which have left to Denmark not one of the dependencies named on the title page I have quoted; a noble example of scientific zeal—a work which would add to the glory of the proudest nation on earth.

The "Flora Londinensis," of William Curtis, is a work deservedly held in high esteem. It is in five large volumes and contains six hundred and forty-seven colored plates. It is said to have been the first Flora to represent plants of their natural size. In the words of a critic, "It may boast of having been brought to a close with unrivalled excellence, undiminished splendor, and unabated accuracy."

It was at one time said that the three grandest indigenous Floras were the Græca, the Danica and the Londinensis. To these must now be added the magnificent and extensive "Flora Brasiliensis," in which Dr. Martius, aided by a large staff of specialists, and encouraged and sustained by a ruler of whom his people were not worthy (the Emperor Dom Pedro II.), has explored the exceedingly rich Flora of Brazil, genus by genus, describing all of the species, and giving drawings and botanical dissections of

many. We hear often, nowadays, that there are few more ornamental or useful plants to be introduced to cultivation, and that the new plants of the future must be produced by hybridization among those we now possess. Those who hold this view will soon change it for a more rational one, if they would examine parts of this work. For example, let them look at the genus Passiflora, the passion-flowers of our gardens, and see the great array of beautiful species not yet known to cultivators. There are many other genera of great beauty that have not yet contributed even a single species for our delight. Of all the Floras we possess, I should suppose the Brasiliensis to be the most extensive.

We have many others, more than I can even call by name in an essay like this; but if all the rest of our books were cheap and commonplace, these four would be sufficient to make our Library notable. But these are simply four which seem to stand foremost amid a crowd of others only a trifle less distinguished, of which I will mention a few, such as Karsten's "Floræ Columbiæ," two folio volumes, containing two hundred plates of the plants of New Granada; the three superb volumes of the "Portuguese Flora," which bear the names of Count Hoffmansegg and Professor Link; Jacquin's "Flora Austriaca," with its five hundred colored plates, a thing of beauty and a joy forever, like all the books which bear his name; the "Flora of the Philippine Islands," a splendid work, illustrating the very rich vegetation of those shores, prepared mainly by Father Blanco, of the Augustine friars, and published in four large folio volumes, at the expense of the order, at Manila, in 1877; the "Trees and Shrubs of the Philippines," by Sebastian Vidal, Manila, 1883; Reichenbach's great work, "Icones Floræ Germanicæ et Helveticæ," in twenty-two volumes, with two thousand eight hundred plates; Boissier's "Illustrations of the Flora of Spain;" the "Flora Italiana" of Cesati, Passerini, and Gibelli; and Ruiz and Pavon's often-quoted "Flora of Peru and Chili."

We are especially rich in works upon the botany of India and Southern Asia generally, and in considering these it is impossible to withhold our admiration of the zeal which the English have shown in studying the vegetation of those dependencies, a zeal which neither the ruggedness of the country, its vast extent, nor its enervating climate could subdue. Some of these admirable works are Colonel Beddome's "Flora Sylvatica of Southern India," with three hundred and thirty plates; his "Plants of

Southern India and Ceylon," with three hundred plates; Dr. Robert Wight's "Figures of East Indian Plants," in six volumes and over two thousand one hundred plates; his "Illustrations of Indian Botany," with one hundred and eighty-one plates, and his "Spicilegium Neilgherrense," with two hundred and two plates; Sir J. D. Hooker's "Illustrations of Himalayan Plants;" the same botanist's beautiful work upon the "Rhododendrons of the Sikkim Himalayas," which gave European cultivators a wider view of that genus by introducing a great number of species distinguished by their size, fragrance, or brilliant colors. In this place we must not forget Dr. Roxburgh's "Plants of the Coromandel Coast," with its three hundred colored plates, Dr. Wallich's "Plantæ Asiaticæ Rariores," with three hundred, or Horsfield's "Flora of Java," with fifty, or Clarke's "Commelynaceæ and Cyrtandraceæ of Bengal." Yet credit for work in those regions is not due to English botanists only, for we have van Rheede's twelve parchment-bound volumes of the "Hortus Malabaricus," with its clear and characteristic, if somewhat rude, cuts of plants of the Malabar coast, with their Malabar and Arabic names; C. L. von Blume's "Rumphia," in four volumes; his four volumes on the flora of Java, and his "Orchids of the East Indian Archipelago and Japan;" all very valuable works with excellent plates. While upon this part of my subject, it would be inexcusable not to exult a little over one of our recent purchases, one of the most valuable of all, Tussac's "Flora of the Antilles," in all probability the only copy in America, and Bateman's "Orchidaceæ of Mexico and Guatemala."

Of works which are devoted to a single class of plants we have a large number. As a sample of our riches in this respect, I will name a portion of the works which a student of grasses can find on our shelves: Curtis's "British Grasses," Lowe's "Grasses," Henderson's "Handbook of the Grasses of Great Britain and America," General Monro's "Monograph of the Bamboos," Ruprecht's "Bambuseæ," Richard Parnell's "Grasses of Britain," George Sinclair's "Hortus Gramineus Woburnensis," one of the volumes in which the collections grown by the Duke of Bedford at Woburn Abbey are described, Karl Bernhard Trinius's "Species of Grasses," with descriptions and three hundred and sixty plates, and Nicholas Thomas Host's "Figures and Descriptions of Austrian Grasses," in four volumes containing four hundred colored plates.

If coniferous trees be the student's subject he may consult, in addition to many I do not now name, Lambert's "Genus Pinus," Murray's "Pines and Firs of Japan," Gordon's "Pinetum," a synopsis of all the coniferous trees known in 1875, Peter Lawson's "Pinetum Britannicum," a description of all the hardy trees of the pine tribe cultivated in Great Britain, and the "Pinetum Woburnense," another of the volumes descriptive of the plantations of Woburn Abbey.

On the subject of Palms the following may be mentioned: Most extensive of all, von Martius's "Natural History of Palms," a great work, illustrated with two hundred and forty-five colored plates; "Les Palmiers," by Oswald Kerchove von Denterghem, which contains descriptions of all known species with synonyms, the latter a very valuable feature; and Wallace's "Palms of the Amazon," a small book and very unpretending, but very interesting, and one which gives much information of a kind which purely botanical ones usually omit. On Ferns we have many and valuable works, of which I shall name but few, for I know there are fern specialists here who can speak of such works with more knowledge than I possess; but Colonel Beddome's "Ferns of British India and Ceylon," with its three hundred and forty-five plates, is a work which may be admired by one who is not a specialist. So may Lowe's "British and Exotic Ferns," with its eight volumes, or Eaton's "North American Ferns," or Fée's five volumes with two hundred and eighty-nine plates, or Sir W. J. Hooker's "British Ferns." This is the most appropriate place to mention the Herbarium of North American Ferns presented to the Society by Mr. George E. Davenport. This is committed to the care of the Library Committee, and is one of the most precious of all their charges, perhaps the most so; for most of our books could, perhaps, be replaced, but the loss of the Herbarium could never be made good. So much time, labor, and expense, combined with so thorough a knowledge of the subject, could scarcely be again employed. It contains every species growing north of Mexico, and all varieties besides which appear to be permanent. There are numerous fronds of all of these, showing the various stages of growth. The herbarium embraces seven hundred sheets and about two thousand five hundred specimens. The number of species is one hundred and sixty-five; of variations upon these, twenty-four.

Some other monographs of great interest are those of Robert Sweet and of H. C. Andrews upon the pelargoniums (commonly called geraniums) of the Cape of Good Hope. These books contain colored plates of all the species and many of the earliest hybrids raised from them, and show that some kinds, which from their beauty or oddity would be welcome to flower-lovers, have never been introduced or have been suffered to drop out of cultivation. H. C. Andrews's "Ericaceæ" (heaths) of the same region contains plates of all species known, many of them plants of most exquisite beauty almost unknown to gardeners of the present day. The fine plants exhibited here occasionally by Mr. Atkinson and Mr. Comley are a sample of scores of species equally fine, but which will probably remain unknown except through Andrews's fine work. Bateman's "Monograph of Odontoglossum" is a book which would grace any library, containing as it does figures in colors of the species of one of the most highly appreciated genera of orchids. The Marquess of Lothian's monograph of Masdevallia, an exceedingly pretty orchidaceous genus, has been ordered and is probably on the way to us. Sweet's monograph of the Cistus or Rock-rose Family gives us one hundred and twelve colored portraits of a genus lacking in this country, but which is very showy and beautiful in light soil in the Spanish peninsula. Fitzgerald's "Australian Orchids," which is still in process of publication, is a worthy companion of the best of its kind. Elwes on the Lily and Maw on the Crocus are monographs which show that art and science may co-exist on the same page. Both books give plates of every species known to the authors in the respective genera. The lilies are, of course, more showy than the humbler crocuses, but Mr. Maw's work is embellished with beautiful sketches of the wild mountain regions of Italy, Turkey, Greece, and Asia Minor, where the various species grow. Though such things have nothing to do with scientific botany, they make the monograph more delightful and beautiful.

The works of Reichenbach on the genus Aconitum (monkshood), of Jacquin on the Oxalis, Lehmann on Primulas and Potentillas, Bureau on Bignoniaceæ, Dunal on Solanaceæ, are worthy of mention, and those of Dr. Kotschy on the Oaks of Europe and the East, of F. M. Liebmann on the Oaks of Tropical America, of Baron von Mueller on the Acacias so characteristic of Australia, and especially his Eucalyptographia, a full account

with figures of all the species of Eucalyptus, would be worthy of extended notice if time allowed.

In the days of our ancestors, when horticulture for the pleasure of it was almost unknown, plants were valued chiefly for their supposed medicinal virtues. Those were the days of the herbals, those encyclopædias of misinformation, containing no doubt some truth. Such books are of little value now except of a semi-literary kind. We have, as is becoming, a good number of them, such as Nicholas Culpeper's, who died in 1654, Sheldrake's, Elizabeth Blackwell's, — the wife of Alexander Blackwell, an agricultural writer who meddled with politics and was beheaded in 1747, — William Salmon's, James Miller's, William Meyrick's, and others. Other books whose value is entirely literary are Bartram's "Travels," a most delightful old narrative; Tusser's "Five Hundred Points of Good Husbandry," sound advice in the main, though he who gave it made a complete failure in farming; and Barnaby Googe's "Fovre Bookes of Husbandry, . . . conteyning the whole arte and trade of husbandry with the antiquitie and commendation thereof, London, 1578." This is one of the old black-letter books, whose very type makes any subject delightful. Some other old books are Besler's "Hortus Eystettensis," Nurnberg, 1613; Rembertus Dodonæus's "Stirpium Historiæ," Antwerp, 1583; Petrus Andrea Matthiolus's "De Plantis," with one thousand and three figures, Frankfort on the Main, 1586; and Leonhartus Fuchsius's "De Historia Stirpium," Basle, 1542. This old folio, with five hundred and twelve colored plates, is the most ancient of our possessions.

Of books whose object is to give portraits of plants according to no plan and with no desire apparently except to illustrate horticulture, we have a great many which in everything but scientific arrangement are of very high excellence; such, for example, as Redouté's "Liliacées," eight large volumes, containing hundreds of beautifully drawn and colored figures. The worthy gentleman construed his title so liberally as to include the Cypripedium among his lilies. Another of these is Jacquin's "Hortus Schoenbrunnensis," with five hundred plates. Of pomological books we have, of course, a great many. I shall say but little of them, however, as I have already talked long enough, and Mr. Manning is here, to whom the whole subject is as familiar as the alphabet. Some noteworthy titles in this department are Bivort's

"Album de Pomologie," with several hundred colored plates; Brookshaw's "Pomona Britannica," of which the plates are excellent; DuMortier's "Pomone Tournaisienne;" Clemente y Rubio's "Varieties of the Vine cultivated in Southern Spain" (a book of great interest); Thomas Andrew Knight's "Pomona Herefordiensis," an account of the Cider and Perry Fruits of Herefordshire; "The Herefordshire Pomona" differing from the last-named more than its title indicates and containing the best figures of apples I have ever seen; and Gallesio's "Pomona Italiana," a work which deserves the adjective *magnificent*.

With this I shall stop. I have not touched upon Forestry, upon Fungi, hardly upon the Hookers, not at all upon the works of Loudon, Lindley, Linnæus, or Bentham; I have not mentioned the colonial floras or American botany. You will no doubt have noticed these and other omissions, but the subject was too large to be taken in an hour. If any one cares to know what we have on these or a score of other subjects, or if he wishes for a fuller account of any topic I have touched upon, let him go to the Library Room and look about him, or let him inquire of the Librarian or his assistant. I speak my own mind, and I know I speak the mind of the entire Library Committee, and I believe of the Society as well, when I say that we all desire to see the Library as fully and as freely used as is consistent with its preservation, — that we welcome to its privileges all persons whatsoever who are interested in these subjects, feeling that this is a possession far too precious to be selfish with.

Discussion.

Francis H. Appleton spoke of the paper just read as an admirable one, showing as it does the many-sided character of our collection of books designed to meet the demands of a horticultural library. The points presented today show many different lines of investigation which can be aided by consulting the classes of books named; yet not all the classes represented in this noble collection of books were mentioned. The Library is rich in books and periodicals devoted to Agriculture, and therefore valuable to the Agricultural interests of the country generally, and especially to the Agricultural Experiment Stations. It is a leader, if not the first, in this line. A glance over Mr. Endicott's

paper will suggest many lines of investigation which individuals may wish to pursue.

Mr. Appleton then moved a vote of thanks to Mr. Endicott for the very interesting exposition of the character and value of the Library, as presented by him today. The motion was carried unanimously.

On motion of Mr. Appleton, it was voted that the Secretary be requested to send a copy of this lecture to each Horticultural Society, and to each Agricultural Experiment Station throughout the country.

William C. Strong thought the lecture very timely. It is necessary that our attention be called to our rich collection of books, that we may recognize its value. Those of us who are more familiar with its extent realize that the Library Room is quite inadequate properly to accommodate the books, and is so situated as to be in some respects unsuitable. It is located upon a very noisy corner. The Society is occupying enormously valuable property, and is therefore paying very high rent for very inadequate accommodations, which are also insecure.

J. D. W. French was glad to hear Mr. Strong's allusion to the importance of procuring increased room, in more convenient form, and in a more suitable location. We need a fireproof building also. We have had one fire, and have since then made this building more secure, but not against a great conflagration. If this building were so destroyed, it could be rebuilt, but many of our books could not be replaced. He thought the books were not used as much as they ought to be. The periodicals are readily accessible, and are used more, but the character and number of the books are not so easily perceived and understood. He trusted the valuable paper just read by Mr. Endicott would be the means of attracting more attention to the value and extent of our Library.

Robert Manning, in answer to the call of the essayist on him, said that when the Society was established the fruit department was more important than any other. Hence among the earliest purchases of books were the seven splendid folio volumes of the new edition by Poiteau and Turpin, of Duhamel's "Arbres Fruitiers" (1808–1835), so costly a work that its purchase would even at this day be a subject for careful consideration. When we recollect that the only funds of the society at this time were derived from

admission fees and assessments, the purchase of so costly a work shows the importance attached to the Library by the founders of the Society. The first edition, in two quarto volumes, published in 1768, the author of which was characterized in Lindley's Pomological Magazine as "the always accurate Duhamel," was not procured until many years later. The "Album de Pomologie," mentioned by Mr. Endicott, was edited by Alexander Bivort, a friend of Dr. Van Mons, with the assistance of L. E. Berckmans, who afterwards settled in this country, and will be remembered by some of our members. He was the father of Prosper J. Berckmans, who succeeded Colonel Wilder as President of the American Pomological Society. The "Annales de Pomologie" may be considered the successor of the Album. Other important pomological works are the "Jardin Fruitier," of M. Decaisne, with colored plates of unrivalled delicacy; Leroy's "Dictionnaire de Pomologie," "Le Verger" and "Pomologie Generale," of M. Mas; "Le Vignoble," by MM. Mas and Pulliat; the "Histoire et Culture des Oranges," of Risso and Poiteau; the many volumed treatises of Diel and Sickler; Lauche's "Deutsche Pomologie;" Lucas and Oberdieck's "Handbuch der Obstkunde;" and the "Schweizerische Obstsorten." The "Pomological Magazine," edited by Professor Lindley (known also as the "Pomona Britannica"), is a work of the highest authority. The "Catalogue of the Fruits in the Garden of the Horticultural Society of London," though not possessing the magnificence of those previously mentioned, is the foundation of all accurate synonymy. It owes its great value to Robert Thompson, for many years the head of the Fruit Department in the society's garden at Chiswick, who was also the author of many descriptions in the Pomological Magazine. Of similar character is the "Guide Pratique de l'Amateur de Fruits," by O. Thomas. The various editions of the "Fruits and Fruit Trees of America," begun by A. J. Downing and revised and enlarged by Charles Downing, form a noble monument to the memory of these brothers. It will be remembered that a copy of the rare edition with colored plates was presented to the Society by Charles Downing but a few years before his decease. The "Proceedings of the American Pomological Society," of which complete sets like ours are rare and valuable, is a monument to the memory of Marshall P. Wilder — for so many years the president of the society, and to whom it was

dearer than any other of the many societies with which he was connected — and his co-laborers. Hovey's "Fruits of America" is the most pretentious American work on fruits, and the thirty-four volumes of his "Magazine of Horticulture" contain a vast amount of pomological information. "The Fruit Culturist," of that careful and conscientious writer, John J. Thomas, in its various editions, should not be omitted, nor the "North American Pomologist," of Dr. William D. Brincklé, an equally careful and accurate writer — illustrated with colored plates of native fruits. The colored plates of fruits in the imperial octavo volume of the TRANSACTIONS of this Society (1847–1852) are of the highest excellence. Time would fail to speak of the many manuals containing descriptions of varieties of every class of fruits, large and small, with directions for their culture, to be found on our shelves. This department of the library is perhaps as complete as any, the purchase of the magnificent "Pomona Italiana," for which we had been looking many years, having supplied the greatest desideratum. There are still, however, other books to be acquired, for which we are on the lookout, and which will be purchased as soon as they can be found.

O. B. Hadwen, Chairman of the Committee on Publication, announced that on the next Saturday we should have a paper by a lady which would be as much of a literary treat as Miss Parloa's was a practical treat — "The Ethics of the Flowers," by Mrs. Fannie A. Deane, of Edgartown.

BUSINESS MEETING.

SATURDAY, March 19, 1892.

An adjourned meeting of the Society was holden at eleven o'clock, the President, WILLIAM H. SPOONER, in the chair.

John A. Pray, of Boston, was proposed by O. B. Hadwen, as a life member of the Society, and Cornelius E. Masten, of Roxbury, was proposed as a member of the Society by Leverett M. Chase.

Adjourned to Saturday, March 26.

MEETING FOR DISCUSSION.

The Ethics of the Flowers.

By Mrs. Fannie A. Deane, Edgartown.

Nature has often been compared to an open book whose pages reveal the most sublime thoughts of the Divine Author, and whose uncut leaves are but awaiting the knife of the scientist to disclose their unknown facts for our apprehension. This book is not an *édition de luxe*, with its print, binding, and illustrations made attractive for the delight of the rich alone, but the poor man, as well as his wealthier neighbor, can peruse this great volume, if he have the will and opportunity.

The gratification which a knowledge of the world around us affords, or the quickening of our intellectual powers, might be a good reason for its close and thoughtful study; but the ethical lessons to be deduced from Nature, in her various forms, make that interesting study, by all mankind, an imperative duty. The illiterate and untaught are susceptible to the impressions received by a knowledge of some elementary law of the physical universe; and the most eager and scholarly students have realized their highest joys in the influences and inspirations which they have received from their observations of the more intricate laws and the workings of the latent forces about them. We may infer, therefore, that there is an innate love of Nature in the heart of every man, and that, through this love, he may be led to the noblest ideals of life.

Each department of Nature has its own lessons of science or art, of literature or morals; but how often is it the case that while pursuing one lesson, some great truth of another science or art, or some new thought or plan of action, is revealed to us!

The miner digs into the earth for its hidden treasure, and, as he descends lower and lower, he not only discovers the treasure, but he proves the fact of the increase of temperature with the depth from the surface, thus getting a lesson in physical geography unsought; the artist learns the chemistry of color as he tones the too brilliant hues of his copied landscape; and the geologist who visits the hot springs of Yellowstone Park, to observe the travertine and silicious sinter, finds himself investigating the vegetation which imparts to those deposits their lively tints of yellow, red, and

green. The lustrous gem gives not only lessons in mineralogy, but also in geometry, and a grain of sand from the shore of old ocean teaches us not only a lesson in the geographical boundary line of land and water, but one also in mineralogy, as the powerful microscope unfolds its likeness to the brilliant ruby, the clearest emerald, or the dazzling sapphire.

Not only is one art or science developed by the knowledge of another art or science, but from the researches into this great book of Nature, as a whole or in either of its parts, are evolved those practical truths which have been the foundation of all good government and human prosperity, but which, when perverted, tend to anarchy and the uprooting of healthy moral principles.

As we ascend the snow-capped mountain or stand on a rock-bound coast, we receive lessons tending toward strength and fortitude of character; we may be incited to sublime and noble actions by the crested waves which roll with such volume and anon burst in thundering tones upon our Atlantic shores, or by the wondrous combination of beauty and grandeur in the river canyons; indeed, we may study with Ruskin the dust, so full of mineral wealth, and gather from it lessons either of beauty, usefulness, and happiness, or we may pervert its true teachings and become proud, envious, and avaricious.

Although all Nature teaches us such impressive lessons, there is no one of its departments so constantly reminding us of some great truth or code for the guidance of human action as the realm of the flowers. What, then, are the ethics of the flowers? One would need to write a voluminous history to record the ethics or moral lessons of flowers which have been learned by nations and individuals in the past.

They have been taught from the day when "the Lord God planted a garden eastward in Eden, and there He put the man whom He had formed," until the day when St. Peter taught immortality from the crown of flowers, and when, in later history, the Scandinavian poet, inspired by the sight of the flowers twined about the shields of the warriors, sang a song of moral philosophy to the king, when he wrote:

> "Know, Helge, it becomes a king
> Gentle to be, though bold,
> As flowers adorn the shield."

Whole nations have, in the past, learned humility from the broom flower, charity from the flower-de-luce, modesty from the violet and mignonette, and enduring friendship from the forget-me-not. It is not the purpose of this paper, however, to review at length the ethics of flowers which other nations have received, but rather to glance at our own country, and endeavor to find what instruction our American nation has gathered, and may, in the future, gather, from her flowers. There is not one individual among us whose character is not strengthened by a love of a sound morality. It is for us, in the very springtime of our American Continent, to devise a system of ethics which will make the future history of our republic without fault or blemish. It was a love of moral principle that made such men as Luther, Cromwell, and our own beloved Lincoln stand foremost as benefactors of their respective nations.

From the flowers we are taught the ethics for our times — ethics that may be profitable for us as individual citizens to know, ethics that if heeded will make of us a nation whose influence shall be without limit.

When Cabot and other early explorers came to our continent, they found the wild flowers in great profusion, turning their petals eastward to the sun as if to welcome the stranger guests. The wild flowers, as a class of flowers, have ever since taught us lessons of hospitality, but, more than all, have given us ideas of philanthropy. As Mary Howitt so beautifully writes, it is

> "Less that they are so beautiful
> Than that they are so plentiful,
> So free for every child to pull,"

that we welcome the blossom-time of the wild flowers. Springing up everywhere in our pathway, they are teaching us of the benevolence of the Creator, and are impelling us, by their example, to bestow our wealth to benefit as many as possible. The wild flowers, by their quiet, unpretentious existence, remind us that ideas arising in the minds of the humblest individuals, when constantly agitated by them, until at last promulgated by those of greater influence, have led to the greatest philanthropic movements that the world has ever known.

The idea of the spherical form of the earth, which was suggested to a poor Italian, and which he laid before so many regal

thrones, and which, at last, the discouraged sailor was enabled to carry out successfully by the assistance of Queen Isabella, led to one of the greatest philanthropic movements ever recorded in history. What man, even though he be a king, can ever bestow such a gift again?

The Western Continent, with its treasures of gold, silver, and copper, its wealth of diamonds, its luxuriant beauty of tree and flower, and its unparalleled variety and grandeur of scenery, was a royal gift to the world. Let it be granted that the Chinese, Norse, or Dutch came here first: the world was not possessed of more knowledge nor made the better because they came. Columbus has given a country of equal rights for all. With our love of the wild flower comes our appreciation of later acts of philanthropy than that of the great discoverer. We have read with wondering delight of the plans of courageous and self-sacrificing men who made themselves homes in the new land.

May it not be true that it was the sight of the trailing arbutus, that modest but courageous flower, the first flower to greet the sick and weary Pilgrims, that gave an earnest impetus toward the civilization of America, a land which then was so new and unexplored? So beautiful in tint, of such sweet fragrance, and so retiring in its beneficence, reminding us, as Whittier so beautifully expresses the thought,

> "Of lives thus lowly, clogged, and pent,
> Which yet find room,
> Through care and cumber, coldness and decay,
> To lend a sweetness to the ungenial day,
> And make the sad earth happier for their bloom," —

may it not have been through this flower that a lesson of philanthropy was given to our forefathers at the very beginning of our nation's life? Other nations were allowed to come and partake of that glorious liberty which they enjoyed, and, although there may have been, occasionally, an unfriendly jarring, or the dire form of war because of unsettled boundary lines, the spirit of philanthropy has spread until now almost every known tongue of the Eastern World may be heard on the streets of our cities, and only John Chinaman, like the brown leaves of our arbutus, is to be discarded.

It was not solely for love of gold that men like Oglethorpe,

Calvert, and Williams founded colonies in the New World, but that the poor debtor or the persecuted Christian might have a peaceful home; it was not for love of gold that men like Humboldt or Kalm made their extensive researches on this side of the Atlantic, but that they might become possessed of botanical knowledge which should benefit the world.

The spirit of philanthropy inculcated by the arbutus and other flowers has extended from generation to generation. Can we doubt this when men like Peabody have given their millions for founding homes for the poor, and for promoting education among all classes of people? Queen Victoria, perhaps, was wise when she offered him a baronetcy, but he was wiser than she when he refused the honor. No empty title was his, but his benevolence had gained for him the royal gift of the people's love on both sides of the great ocean.

True philanthropy, or love to man, consists not alone in the bestowal of money, but is shown in the humanitarianism of a Beecher, and in the moral heroism of a Garrison or a Phillips. Those men who today are leaders in our great reforms have been imbued with an earnest, conscientious spirit of love to their brothers, and, in their fearless utterances of bold and decisive truth, are but imparting the lessons of the courageous and philanthropic wild flowers.

All the great schemes for pecuniary aid to mankind in our day seem to be either for the purpose of assisting colleges and other schools, or for lifting up the very poorest and lowest classes of society. Do not the flowers appeal also to us for that class of intelligent and industrious citizens who have toiled through a great part of their lives on small salaries, and have, by force of circumstances, no means of support in old age? Is there not some heart large enough to solve this problem by establishing some fund from which annuities can be paid to deserving citizens of this kind?

Closely interlinked with the thought of philanthropy is the law of unselfishness. Blooming in every spot that sunlight can penetrate, taking ofttimes the most lowly forms in the marsh or pond, or swinging the bell-like corolla from the crevice of the rock, now hiding its brilliant coloring far beneath the snowy carpet, or choosing the highest part of some dangerous cliff, the flower would impress the duty and pleasure of unselfishness upon us.

The old idea that a man must look out for himself to the exclusion of his neighbor is not an obsolete one today. No imagery can depict the injuries of this hideous monster to individual, town, or nation. The pampered child, the schoolboy who demands so much from his fellows and yields not a point in his games, becomes the selfish business man or government official.

When, in the history of our nation, have come days like those which followed the attack upon Fort Sumter, and the selfish ambitions of certain leaders have well-nigh plunged our country into despair, it is then that we have looked about us for means to prevent a future recurrence of such a calamity. Cannot we who are constantly associated with children teach them a lesson of unselfishness from the flowers, so far that the idea of crowding out their neighbors may not become an all-absorbing passion when they arrive at manhood?

It is said that when the Archduke Maximilian and his accomplished wife Charlotte accepted the empire of Mexico, and crossed the sea to take possession of their new dominions, supported by the French, they wished to institute an order to be bestowed as a mark of favor upon all those whom they desired to honor. The empress decided that the color of the ribbon of the order should be red. Napoleon III. objected, because red was the color of his own Order of the Legion of Honor, and he did not choose to have it copied. Indignant at his selfishness, yet full of spirit, the young empress inclosed a poppy leaf in a letter to the emperor, and wrote that the Order of Nature was before the Order of the Legion of Honor, and that she chose her ribbon from the hue of the poppy.

As each floweret finds room to unfold its petals in its own sweet dignity, and there is enough sunlight for each, so in this world of ours each man may find for himself a niche where he may stand and reflect the beauties of a noble and generous character in his dealings with his fellow-men.

The rivalry of authors, the inclination of a book publisher to advertise the writings of his own brother and wife more extensively than those of others just as worthy, the selfish ambition of a broker to control certain stocks, which has often resulted in forgery or suicide, or perchance in the explosion of dynamite to further ambitious schemes, and the aspirations of an officer who would sacrifice his country if only he might be re-elected to office,

are convincing evidences of the need of an early mind-culture in this regard.

If individuals be generous, the nation will not be selfish and exclusive. Among the political philosophies of olden time the boundary line of one's nation included all the human beings to whom he owed any duty of love or care. The State was sacred. Today, although willing, if need be, to defend our rights, let the flowers teach us as a nation to be in accord with other nations, thus recognizing the unselfish love of our brother man as the true force which holds the moral world in harmony.

Exotic as well as indigenous flowers, the cultivated as well as the wild flowers, teach us the need and helpfulness of variety in our lives. There is no monotony in flower-land. Something new in flower is ever being presented to us. An old flower with a new costume meets our eye when we look at the pansy of today; the wild rose, with its scanty dress, has been transformed into a flower whose petals fold into the regal robes of a La France or the rich drapings of an American Beauty.

The Caucasian race is a restless race. It demands variety, and a dull, prosaic life would deprive it of half the charm of life. Perhaps no better example of the necessity of change in occupation, and the benefits resulting from it, can be found than that of Henry Ward Beecher. When he advised young ministers to give time for the garden as a means of relaxation, he said: "I speak with moderation when I say that all the estates of the richest dukes in England could not have given me the pleasure I have felt when riding through the unoccupied prairies bright with wild flowers, or by the waysides rich with the coloring that Nature, unassisted, so bountifully bestowed."

The flowers, then, which delight us with their variety of form and color, have taught the American nation a lesson of healthful change; have taught them to look onward from the weariness of labor to the restfulness of home, to devise new methods and plans, to discover hidden forces which shall lighten labor, and, by their application to the old ways of industry, cause them to yield greater and more speedy results.

On the eve of the nineteenth century began in Europe the great modern revolution. With the new and masterly truths of science and their application, the middle class of people began an era of prosperity, and grew noble withal through their noble deeds. So

after our Civil War, the middle class was changed in position; some by their heroic acts made themselves famous, and money was more universally spread among the people. The further application of steam power, the extent to which electricity is transforming our landscapes into visions of beauty, the new ideas of train telegraphy, and the late idea of Edison which would enable us to telegraph by induction on land and sea, without the aid of wire or cable, the electric fans which blow the smoke from the guns on a fighting ship out of the turrets, — all these, together with the successful experiments in forcing the growth and blossoming of plants by electricity, are changing entirely our methods of business life, and our old ideas of military needs or of horticulture.

Shall we grumble that this change has been accomplished, and that men can now give time to a little rational enjoyment in the homes which have been saved to them by these improvements and inventions?

It is said that one is never tired of the endless variety of plants in the garden of the Nizam at Hyderabad, India, there being six millions of potted plants alone, besides the multitude of larger ones. These cultivators in India have had the experience of centuries to teach them the art of arranging plants so as to produce the most varied and charming effects; but although in America we are but beginners in floriculture when compared with India, yet we are gathering lessons from the multitudinous varieties of our own flowers that compel us to come out from the narrow grooves into which we have fitted ourselves heretofore, and make our lives broader by adapting ourselves easily to the successive changes in our times.

We are not to derive ideas of fickle government, however, from this variety in the flower-world. As the rose is a rose still, notwithstanding its loveliness may be increased by its new tints and multiplicity of petals, so our government remains intact, while its influence and power are redoubled because of its added strength from intellectual development. Let us, then, greet the new plans which our younger America may devise with something more of hearty good-will than was accorded us by our ancestors, and read between Nature's pencil-like tracings upon the delicate petals the signs of our times.

To be the most useful person, one must be a cheerful person.

Do we cultivate our plants in a darkened room? As nearly all plants require light to bring their blossoms to perfect symmetry, so our characters should impart cheering influences to those with whom we are associated. The flowers compel us to be cheerful.

No influence from them is so clearly manifested or more potent. Who ever saw a morose florist, or who ever saw a woman in more happy mood than when busy among the flowers? Is not the home more cheerful for even one blossom placed within it? Then will not our community and nation be correspondingly cheered as the love of flowers is increased?

Cheerfulness, grace, sympathy, and adaptation for every occasion and emergency, the Divine law of order, wise and cultivated conversation, which Emerson called the last flower of civilization, and moral beauty of character, — these are some of the home lessons of the flowers.

The æsthetic mind, as it meditates upon the flowers, can only see the form which it wishes to convey to the canvas; but when the canvas has received its flower-type and the brush is laid aside, that mind must lack much of culture, if it fail to discover within the corolla the charm of that moral beauty of which it is a fitting emblem.

There is an old German tradition concerning the origin of the moss rose, which says that an angel bent on a work of love came down to earth as mortal. He was grieved at man's sin and want, and he looked in vain for a place to lay his weary head. At last he found a shelter in this rose, and left a proof of his love to remain with it, when he gathered "the green moss around the stem," bade it defy the winds, so that it now,

> "Shielded thus in its brilliant dyes,
> Gives signs of an angel's power."

And as of the moss rose, so the poet might have sung of many another flower. Our nation's welfare will be best promoted when the homes are the purest, and when they are filled with that happiness and content which flowers have ever symbolized.

Perhaps the American nation has no need to be reminded that the flowers teach energy and diligence as well as sweetness and delicate passiveness. We are, with the exception of a few sections of country, a diligent people. Are not the buzzing of our mills and the clicking of our wires heard all over the world?

Are we not before long to show to all the world our educational systems, our mining industries, our manufactured articles, our electrical inventions, our mechanical appliances, our Western grains, and our Californian fruits? Can we not with pride exhibit the rapid progress we have made in four hundred years, and especially within one hundred years, in the architecture of our residences and our public buildings? Shall we not point out to our visitors, our miles of railroads and our lines of steamboats, to convince them of our industry and progress?

May we not especially call their attention to our displays of flowers to give them one of the best proofs of our diligence? We can show them our Massachusetts orchids and chrysanthemums in contrast with the simplest flower of field or swamp which was known to the Indian "medicine men."

Will not the energy of the horticulturist and the patience with which he waits for the development of some new floral creation teach us as a nation, as the flowers have long since taught him, that a well-directed energy, an energy not hampered nor dwarfed through fear of offence to one or another section of country, nor biassed by the opinions of foreign powers, will make us a prosperous and really independent nation?

As we look down the columns of our daily papers, we can but notice the generous space allowed for records of different athletic games and sports. Whether the red ribbon of Harvard or the blue badge of Yale has received greater honor from its champion rowers or trained football-team seems to be, for the day, a momentous question. Perhaps this is well-directed energy, in that it tends to make strong and healthy youth — youth that by and by, in an encounter with some formidable (?) foreign power like Chili, may perform commendable service for their country. We would not underrate this means of developing muscle; but would it not be a less dangerous preparation for life's perilous adventures and battles, bringing reduced bills from college surgeons, to establish a competition in the ornamentation of college grounds? Beyond the planting of the class ivy or the occasional class tree, does the student ever think of beautifying the classic soil of Alma Mater? If students were inspired by a love of the flowers, a small amount of exercise in that direction might lead to a more general development of muscle, and at the same time stimulate the powers of the intellect so that the student should come forth

from his university life as well fortified for future contests as under the excessive exercise of foot and arms, at the expense ofttimes of both heart and head. Oh that the flowers may teach our younger citizens the evil influence of misdirected energy and wasted time, so that they may know that our nation is looking to them for a perpetuation of the great truths which have been the foundations of our nation's prosperity!

If it be essential to American politics that we have a national gymnasium at Washington for free training in boxing and wrestling, as has been recently intimated, is it not a real need that our government make an appropriation for a national school of horticulture in the same city, or some more desirable location, in order that the United States may dignify horticulture, and that these younger citizens may be well prepared for an honorable occupation? The old jingle, "For Uncle Sam is rich enough to buy us all a farm," is doubtless true, and certainly our government can afford space and money enough for a garden which might compete with Kew or outrival St. Louis. What would be a greater attraction or benefit than a garden of this kind, with a national school of horticulture in its vicinity? Every loyal heart is made more loyal by the sight of his country's flowers. They are to him like a glimpse of his nation's flag. The flags have been raised over our school-houses to instil patriotism into the hearts of our children; so the modest violet revived the courage of the French when Napoleon was at Elba, and held them as his subjects. Although we have, as yet, no national flower, and our republicanism would exclude the idea of a royal flower, yet our indigenous flowers breathe forth a love of native soil and excite a spirit of loyalty in every American heart. Cannot this loyalty be increased by the teachings of a school of horticulture? A joint committee of the Gardeners' Company and the Royal Horticultural Society of England are considering the subject of a technical school of horticulture in that country, for the purpose of imparting education in the principles and practice of the cultivation of fruits, flowers, and vegetables, and will secure land for practical lessons in gardening if the school be established. Some of our own citizens are advising the introduction of text books on horticulture into our public schools. Both of these plans are calculated to increase the sentiment of loyalty to native land.

The integrity of a nation is its strongest foundation for pros-

perity. Washington said, "The propitious smiles of Heaven can never be expected on a nation that disregards the eternal rules of order and right." Every flower is true to the germ from which it springs. The bulb of a lily never produces a sunflower, but produces a lily as true in pattern and as delicate in fragrance as was the ancestral lily. We reverence truth throughout all Nature; it meets us everywhere in flower-land. With Newton, we might feel ourselves as only "youth picking up shells by the great ocean — truth." If Newton, philosopher that he was, felt like a beginner in the study of scientific truth, we, as a nation, are but young in our conceptions of the glorious rewards which await a nation whose watchword is integrity. Is there not danger that party aggrandizement or a fear of losing personal popularity may sometimes cause us to waver from a strictly upright course? Our momentous issues of tariff and silver reform can be decided by no better laws or principles than those which are based upon the firm foundation of truth.

The famous rose bush of Hildesheim is said to be fully eight hundred years old. It is called the oldest and most famous bush in the European world. It died to the ground during the latter half of the last century, and its present height of thirty feet represents a hundred and ten years of growth. Year after year, century after century, has this noted bush blossomed for the delight of those who live in this little town in Germany. So will our republic have a long life, if its acts are founded in honesty as firmly as are founded in the earth the roots of this venerable rose bush.

Flowers, oftentimes, teach forcibly through their representations. When one enters upon his work of art in such a spirit of consecration as is attributed to that "painter of beautiful dreams," Albert Moore, so that even the engravings of his paintings, "Rose Leaves," "Midsummer," and "Yellow Marguerites" convey to us such ideas of restful beauty, when the flower name is so true a description of the faces in the pictures, we catch then a glimmer of the moral beauty of character which the flowers would impart to us.

Not only are the ethics of flowers taught through the pictured thoughts of great masters, but there can be no more beautiful relations of flower and mind than are taught in the writings of Shakespeare and Shelley. Shakespeare fills our minds with an

intense love for the flowers, as he interprets their language for us; and Shelley, when he writes of the

> "Lily of the vale,
> Whom youth makes so fair, and passion so pale,
> That the light of her tremulous bells is seen
> Through their pavilions of tender green,"

makes real the impression which the mind receives from the flower. Both writers seem to impart new life and even soul to the wild flowers and cause them to shed their influence upon us, thereby bestowing an experience of the tenderest and most exquisite emotions possible to humanity.

These types of the flowers, whether in picture, poesy, or sculpture, are but indifferent teachers, however, when compared with the living flowers. As individuals we listen to their teachings of honorable dealing and loyalty, of true friendship and all those traits of character which constitute it. How to apply them to our nation so that our government shall be a government dictated by a love of moral beauty, and not one to crumble into the débris of moral ugliness, is a question which we shall be wise to consider. As sometimes architectural decorations become abused by unnatural arrangements of wreath or festoon, so a good government may be destroyed by enemies within its borders — its unloyal citizens. Let not this calamity befall our republic while her flowers continue to bloom in such profusion and loveliness. As time moves on, and the possibilities of horticulture shall become grander and more magnificent than we can now imagine or foretell, so our republic in its glorious liberty and in its wonderful progress of enlightenment, shall arrive at the acme of national honor and prosperity, if she but listen to the ethics of her flowers.

Discussion.

Benjamin P. Ware had listened with a great deal of interest and pleasure to the reading of this paper. It takes a broad ground in the consideration of topics of general interest. We have been given much food for thought in the unusual application of the influences of the beautiful productions of nature. He had been filled with delight and admiration not only by the novelty of the horticultural art-studies presented, but by the happy illustrations

from government and many other aspects of our public social life. He moved a vote of thanks to Mrs. Deane for her very pleasing address, which motion was unanimously carried.

The Chairman of the Committee on Discussion announced for the next Saturday a paper upon "The Relation of the United States Weather Bureau to Agriculture," by J. W. Smith, Forecast Official of the United States Weather Bureau, in charge of the Boston Station.

BUSINESS MEETING.

SATURDAY, March 26, 1892.

An adjourned meeting of the Society was holden at eleven o'clock, the President, WILLIAM H. SPOONER, in the chair.

John F. Newton, of Roxbury, and Henry C. Cottle, of Boston, were proposed by Charles E. Richardson; F. A. Peutterich, of Cambridge, by Edwin A. Hall; and Walter S. Parker, of Reading, by Leverett M. Chase, as members of the Society.

The following preamble and resolutions, presented by ex-President William C. Strong, were unanimously passed:

For so long a time that the memory of the present generation runneth not to the contrary, the "Boston Evening Transcript" has been the medium for the publication of the reports of the meetings and exhibitions of this Society — a relation brought about by the fact that Henry W. Dutton, Esq., the senior member of the firm which founded the "Transcript," early became a member of the Society, in which he soon rose to a prominent position, both as a practical horticulturist and a wise counsellor. Almost since the commencement of these meetings for discussion the "Transcript" has published abstracts, more or less full, of the papers read and the discussions thereon, and for the last ten years we have had laid upon our table at every meeting copies of the report of the meeting the Saturday previous. The Society deems this a fitting occasion to make grateful acknowledgment of the assistance it has thus received in promoting the objects for which it was established, and it is therefore

Resolved, That the hearty thanks of the Massachusetts Horti-

cultural Society be presented to the Boston Transcript Company, and especially to the treasurer, William Durant, Esq., long a member and a steadfast friend of the Society, for the exceedingly valuable services they have rendered in diffusing the information on horticulture gathered at the meetings held by the Society for the discussion of subjects pertaining thereto.

Resolved, That this preamble and resolutions be entered on the records of the Society, and that a copy be sent by the Secretary to the Boston Transcript Company.

The meeting was then dissolved.

MEETING FOR DISCUSSION.

Relation of the Work of the Weather Bureau to Agriculture.

By J. W. Smith, Local Forecast Official, United States Weather Bureau, in charge of the Boston Station.

The subject of my remarks this morning is the relation of the work of the Weather Bureau to Agriculture. I shall first take up the origin of the service and its early history, then speak briefly of its work and methods, and finally mention some plans for the future. It was established by Act of Congress February 9, 1870, and its care and supervision were placed in the hands of Brigadier-General Albert J. Myer, the Chief Signal Officer of the Army; hence its name, until recently, was "Signal Service." It was strictly military in its organization, the employees all being officers and enlisted men of the army. A school of instruction was established at Fort Whipple, Va., the name of which has since been changed to Fort Myer, in honor of the first chief of the service. The Act establishing the service was the first government legislation looking to a National Weather Bureau; its first work was the beginning of official effort to solve the problem of the American weather. The duties, as set forth in the Act establishing the service, are to take and record meteorological observations, and report and give notice by electric telegraph of the approach and force of storms, for the benefit of commerce and agriculture. On November 1, 1870, the actual work began with the 7.35 A.M. observations, taken synchronously at twenty-four stations. The elements of observation were temperature and

pressure of the air, also the per cent of moisture or relative humidity; temperature of the dew-point; direction, force, and velocity of the wind; kinds and amount of clouds; amount of precipitation; rain or melted snow in inches and hundredths; character of the sky; and the state of the weather. In addition to this a record of all special phenomena, such as auroras, halos, thunderstorms, tornadoes, waterspouts, earthquakes, etc., was required. The data were telegraphed to the Central Office at Washington at stated times, and from thence transmitted in the same manner to offices located at the commercial centres of the country. The observers disseminated the information thus received through the medium of the daily papers, by the public display of bulletins, and by other methods.

The foundation was now laid, and it proved to be on a rock and ready for the building of what is now the finest weather-service in the world. Nearly all civilized countries now have weather services of more or less extent and efficiency, but with the exception of the study of the climate and some of the special phenomena by the European services, we are far ahead. Our system of observations and the manner of collecting the data and of putting the information before the public are incomparable.

The public, however, were not long satisfied with tabulated reports of observations and bulletins of thermal ranges and barometric pressures. The attention of scientists and the learned people of the country was attracted and their interest aroused, and they soon demanded deductions looking to the benefit of commerce, marine interests, and agriculture. The pre-announcement of future weather conditions and changes, and the approach and force of storms; warnings of cold waves, early and destructive frosts, freshets, and floods, were expected. In order to fulfil these requirements the chief of the service called to his aid learned meteorologists and scientists, and on the 19th of February, 1871, one year and ten days from the passage of the Act establishing the service, began the issue of the probabilities and a synopsis of the weather conditions. The probabilities, afterward known as indications and now as forecasts, were indirectly in the interest of agriculture.

The next step to receive consideration was the display of storm-signals at stations on the seaboard and the Great Lakes, giving warning of dangerous wind-storms. The first warning-signals were

displayed at twenty stations on the Lakes and the Atlantic and Gulf coasts, the display being made by means of large flags by day and colored lights by night. These have proven of such importance that now there is a chain of these warning-stations extending from the mouth of the Rio Grande river to Eastport, Me., and throughout the Great Lakes, as well as along the Pacific coast. The large ocean-steamers care little for the ordinary storms, but the owners of sailing vessels and the coast steamers watch the signals carefully and are guided by them. So step by step the work has advanced for twenty years. The observing-stations have increased to over a hundred and fifty, nearly all being provided with continuously self-recording instruments. In addition to these there are over two thousand voluntary observer stations, all doing work under the direction of the government; there is a special department for the study of cold waves, and warnings can now be given of their approach from twelve to thirty-six hours before they reach us, and a system for displaying this information has been established for the benefit of growers and shippers of perishable goods; a system is also in use for displaying by flags and mill whistles the daily weather forecasts from thirty-six to forty hours in advance.

The great territory of the United States has been divided into districts and the special interest of each looked after; and as the issue of the probabilities was indirectly in the interests of agriculture, it is with this division into districts and the special study of each that the direct coöperation with the farmer, the bone and sinew of our great country, began.

In the cotton belt a special system of rainfall observations and temperature for the benefit of the planter and dealer has been begun, and it is remarkable how carefully these reports are studied by the dealers here in Boston. A heavy rain or cold wave there will vary the price here very much, and as a large part of the cotton spindles of the United States are turned by the Merrimac river and almost every pound of cotton is bought through the Boston offices, you can readily see what the value of the knowledge is. In the early strawberry season, when the New Jersey crop is being harvested, the information of a heavy rain there will greatly vary the price in the exchange. The flood warnings throughout the great valleys of the Mississippi are of incalculable value; thousands and thousands of acres of the most productive land

that the sun shines on are subject to the overflow of the Father of Waters, and for years the service has been successful in giving timely warnings of the approach of these floods. Through the observations of the service it has become known that hundreds of square miles of land in the western part of our country, which a few years ago were considered little better than a desert, have seasonable rains and therefore are valuable for cultivation. I might go on and tell you how the observations are being utilized for the study of our climate in relation to health, how the daily forecasts are depended on by almost every branch of industry, and how scientists are studying the vast amount of data collected, to ascertain if possible whether our climate is changing.

This last point is of much interest, both scientifically and practically. Perhaps some of you read what Professor W. M. Davis of Harvard University said to a "Globe" reporter some weeks ago on the subject. He said that "we speak of an old-fashioned storm or an old-fashioned winter, just as if such storms or winters had gone out of fashion now, and that this habit of referring to severe winters in the past may be caused by some such state of mind as that produced by the arrangement of telegraph poles along a road. Those near to us seem to be far apart, but as we look back they seem to be much nearer together. So it is in relation to the storms of years ago. Strong impressions made by heavy storms remain, and the space of pleasant weather between the storms is forgotten until we remember the storms as though they were crowded together. As a matter of fact," he continues, "severe storms occur just about as frequently now as they did in the past."

We are asked a great many times how we make these forecasts, and on what ground we give warnings of approaching frosts or heavy storms; and among many minds no distinction is made between the regular Weather Bureau official and some Wiggin or Vennor or the old almanac-makers. But the distinction is very wide and simple: while the Weather Bureau official makes a definite forecast for a definite time in advance, and tries to tell you just when the temperature will begin to rise or fall, and what the wind and weather will be to-morrow or next day, the astronomical meteorologists will say, "About this date there will be a storm," or "Between the 25th of September and the 5th of October, look out for a frost," without saying where the storm will occur, or that a year almost never passes without a frost between the 25th of September and the 5th of October.

The observers at all these regular Weather Bureau stations take the observations twice each day, at 8 o'clock A.M. and P.M., and telegraph the result to Washington; there charts are made, and part of the data are telegraphed to the central stations all over the country, where maps are made for their immediate vicinity. On these charts or maps is expressed — by figures and symbols — the exact weather-conditions at each station, and then by drawing a system of lines — isobars and isotherms — we can indicate different weather-areas or waves of good and bad weather. Then, knowing the laws of storms, by just a glance over the charts or maps, one can tell what weather conditions we are liable to have to-night or to-morrow, and in some cases several days in advance. The issue of these maps is one of the most important duties of the local officers now. The office here at Boston is the birthplace of this map, and it is here that most of the improvements have been made in the appearance of the map and in the system for printing a large number of copies in a short space of time. The results of observations taken on the Pacific coast at 8 o'clock this morning were being entered on the chart here in Boston at 9.30, together with those from all over the country, and by noon, or a little after, the map is ready for the mail. Boston issues now about eight hundred and fifty copies a day.

Our air is constantly in motion, — not only the surface wind, but the whole envelope of air, — and the waves of dense or rarefied air are indicated by the barometer; and it has been found that areas of low barometric pressure are accompanied by clouds and rain and warm weather, and that the areas of high pressure are accompanied by clear, cold weather. Another important law is that the wind always blows from an area of fair weather with high barometric pressure toward a stormy area, or one with clouds and low pressure, and the velocity of the wind depends on the sharpness of the gradient — as it is expressed — or difference in the density of the air. Hence a storm does not always mean rain or snow, but means a decided disturbance of the atmosphere indicated by stormy surface-winds which move from place to place. A cyclone is a very large storm, of from five hundred to one thousand miles in diameter, with entirely different weather-conditions in different parts of it, and moving at an average rate of six hundred miles a day across the country. They do not spring up in a few hours and fade away again as quickly, but are generally several days in forming,

and then they generally move thousands of miles before dissipating. In our latitude they always move toward the east, not directly from west to east, but in an easterly direction. In the cyclone we have the winds blowing inward from all directions and spirally upward; on the eastern side, in our latitude and longitude, they are blowing from a warm to a colder region, and they generally give clouds and precipitation; on the western side, they are blowing in the cold currents from the north, and the weather is generally clear, though sometimes accompanied by squally, rough weather. Anti-cyclones are the opposite of cyclones, and are marked by the returning air-currents. They also move toward the east and represent the crests of the air waves, while the cyclones represent the troughs.

The cyclones pass eastward over the United States in three general classes. The most frequent path is over the Lakes and down the St. Lawrence Valley to the north of New England. These give us, first, easterly winds, then backing to southerly and increasing in force, with rising temperature, clouds, and generally light precipitation. As the storm-centre passes to the Gulf, the wind backs to west or northwest and clearing weather obtains. The second path is from the Mississippi Valley toward the Gulf of Mexico to our southern coast, and then northeastward up the Atlantic coast. The third class and the least frequent are the West India hurricanes. These form somewhere in the tropics and move northwestward until somewhere in the vicinity of our southeastern coast, where they curve toward the east and move northeast up our coast; they are the most severe of any. Each of the last two classes gives us high northeasterly winds, and, if it be in winter, heavy snow-storms. Thus by tracing the path of the three classes we can see why New England has so much weather, and why our days of clouds and storms and our days of fair weather and sunshine follow each other with such irregularity.

Some of the special lines of work which the bureau is now taking up through its several branches are: collecting accurate meteorological records for climatic investigation in relation to the growth of crops and the health conditions; the collection of reliable crop-information and the weather affecting crops, and the issue of weekly crop-bulletins through the summer season; more special and specific weather-forecasts by the local forecast officials and a wider dissemination of these forecasts in the agri-

cultural districts, and the establishment of frost-warning systems throughout the fruit, tobacco, and cranberry growing sections.

The collection of records for climatic study is done by the regular stations and by the voluntary observers. We often speak of the climate of a State or country, but it is found that not only does the climate of countries and States differ, but that each town and each man's farm has a climate peculiar to itself, and that the study of the climate of your farm and its influence on the growing crops will not apply to your neighbor's. We can never hope to establish a station for studying the climate on each man's farm, although there is no question that each farmer would be benefited if he should pay more attention to the study of the climate and its relation to his several crops. We do hope to see the time when accurate records may be kept in every town; we now have about a hundred and fifty in all New England, and nearly one-half of these are in Massachusetts. The State Agricultural Experiment Stations are seeing the importance of some investigation in regard to climate and plants in both this and other countries.

Through the summer months a large number of crop-correspondents are enlisted all over the country for the purpose of gathering reliable information on the progress of the crops and the effect which the weather is having upon them. This information is condensed and issued in weekly crop-bulletins, and by following these bulletins from week to week one can make a correct estimate on the condition of any crop in the country, or in any State or county. This is one of the most practical works that the Weather Bureau is doing, and we are now enlisting the voluntary services of men in different sections of New England for the summer. We furnish blanks, and welcome reports from any reliable men who will send them weekly for the information which we can give them through the bulletins.

With the transfer of the Weather Bureau to the Agricultural Department, twenty local forecast officials were appointed. The country has since been divided into districts, and each official is instructed to make special study of the weather for his district and forecast for the same. This is what they are doing, and through the coming summer it will be the special effort of the officials in New England to predict for different crops and for different weather as the crops are affected by it. Beginning with January 1, 1892, the forecasts are made for a longer time in advance.

Now the forecast received by the displayman in the early morning covers the probable weather until midnight, and those received about noon indicate the weather until 8 P.M. of the following day. The forecasts are telegraphed to centres and there the display is made by flags or by mill whistles. Thus the probable weather for one day can be indicated on the previous afternoon. This must be of much importance during the summer months.

A special study has recently been made of the cold waves, and it has been found that they originate up in the far northwest, over the great plains of British America, and then sweep down over the country. Like the storm areas, they come in three classes, although they do not follow the same paths as do the latter. One class may be designated as those which spread from Manitoba down over the Lakes and New England; they are of short duration, but are sharp, and the temperature falls low and rapidly. A second class spread down over the Great Plains, across the Mississippi Valley, and then over the whole eastern coast; these are of much longer duration, and sometimes cause much damage and suffering in the southern States. The third class is intermediate.

Cold waves are generally accompanied by high northwest winds, and they come just behind the storms or cyclones and just in front of the anti-cyclones. Coming as they do just after a spell of comparatively warm weather, they cause very rapid and strong falls in temperature, which make it seem very cold. In the West they have the cold northers or blizzards, when the temperature falls forty or fifty degrees in as many minutes, and the air is filled with fine particles of ice that cut like a knife. In New England we frequently have a fall of from thirty to fifty degrees in from twelve to twenty-four hours; but if we will take notice our lowest temperature does not come with the cold high wind, but occurs in the clear calm air after the windy front of the anti-cyclone has passed over. You all know that during a cool spell in summer we are not afraid of frosts so long as the wind keeps up, but after it goes down and we get the still air of the anti-cyclone we feel anxious about the crops.

One of the first steps in behalf of the farmer in the history of the service was special telegraphic warnings of early frosts. The first warnings were telegraphed to New Orleans during the season of 1879 for the benefit of the sugar interests of Louisiana. This was an experiment in which the chief of the service was not the

most sanguine of success. Even though the warnings were timely, it was doubtful whether or not they would really prove valuable. The following resolution passed by the Chamber of Commerce of New Orleans at the close of the season speaks for itself: "*Resolved*, that the action of the Signal Service in giving the recent frost-warnings which enabled our sugar planters to guard against injury to their crops deserves the approval of the planters and merchant-factors of Louisiana, as having added to the confidence of investment and to the value of the culture of the staple import of America, independent of foreign supply." Thus encouraged, the reports were repeated the following year, and the warnings were extended to Florida for the benefit of the orange-growers, and again the work was declared beneficial. It was then decided to organize a complete system of frost-warnings, and by the beginning of the season of 1883 it was in operation, with twenty-six centres from which the information was distributed to seven hundred and sixty-three stations. The records and correspondence of the bureau give abundant evidence of the value of these warnings. It was by these reports that the great blizzard of 1886 was heralded far in advance of this never-to-be-forgotten arctic wave. It was during this cold wave that Galveston Bay was frozen over, and several people were actually frozen to death in this sub-tropical climate; it speeded on its way to Florida, little tempered by the warm waters of the Gulf; it spread over the Land of Flowers, and the much-disputed and talked-of "frost line" was something of the past. The Boston observer was then located at Jacksonville, Florida, in charge of that office, and at that station the mercury went down and down until within fifteen degrees of zero. For three days it was below freezing — the coldest since 1835 — and everything out of doors was frozen. Oranges picked from the trees and thrown to the ground burst into pieces as would a stick of wax. While the official warnings were timely, they were somewhat unknown to the general public and wholly credited by only a few. To those who took the warnings at their full meaning thousands of dollars were saved in fruit alone, to say nothing of the trees. Many who had heretofore felt little faith in the prophecies of the Signal Service were true converts. Yes, the three days' freeze will long be remembered in Florida. Large groves of oranges were saved by continued fires; to maintain which it was necessary in some cases to tear down and burn

the fences, packing-houses, and everything except the dwelling-houses. Mr. Smith tells an amusing little incident regarding this cold wave. Soon after hoisting the well-known white flag with black centre, an acquaintance, a member of the newspaper fraternity, called at his office for the usual item for his paper. He related a remark which he overheard from a Florida cracker while coming down the street. The man of the farm cast his weather eye to the roof of the office and remarked, "I'll bet that —— —— weather-man is dead drunk, for thar he has his white rag out and not wind and cold enough to take the wrinkles out." Mr. Smith often says that he should like to have heard his remarks three days later. To bring an example nearer home, a farmer of Hanover, N.H., visited the local office last November and stated that the warning of the first cold wave last season, announced on the daily weather-maps, saved him over three hundred dollars; the cash placed in his hand would not have been worth more.

We are often asked why crops are injured by frosts when the thermometer gives a reading of forty degrees or over. This is because on a clear night the plants become cooled by radiation of heat into space, and, becoming cooled, they have cooled the air immediately around them; and as the air is a very poor conductor of heat, the layer of air near the surface of the ground gets much colder than that a few feet above the ground or up where the thermometer is usually hung. So if one wishes to get the temperature at any time during the night, he should place the instrument down near the plants for a little while before reading. Mr. T. S. Gold, the Secretary of the Connecticut State Board of Agriculture, tells me that he remembers a time when this line between the cold and warmer air was so sharply marked that the lower half of some fruit-trees growing on a level plain was completely killed, while the upper half was untouched and bore an abundant crop of fruit.

Radiation of heat into space is going on all the time, but of course is most noticeable during the night; and, as it goes on all night, it follows that plants or other bodies will grow colder and colder. But an important question is whether the temperature will continue to fall all night. An answer to this question may be found in a publication of the Signal Service entitled "To Foretell Frost," known as Signal Service Notes No. 3. This was intended more particularly for those who were too far from the

cities to get the daily weather-reports. It was submitted to the chief of the service by Captain Allen in a letter as follows: "Sir: the accompanying notes will be of great value to horticulturists and others who live in places not reached by the bulletins of this service." In the notes Captain Allen says: "The ascertainment of the dew-point is of great practical importance, particularly to horticulturists, since it shows the point near which the descent of the temperature of the air during the night will be arrested; for when the air has cooled down by radiation to this point, dew is deposited and latent heat given out. The amount of heat thus set free being great, the temperature of the surrounding air is immediately raised. The same process continues to be repeated, and thus the temperature of the air in contact with the plants and other radiating surfaces may be considered as gently oscillating about the dew-point." Thus the dew-point determines the minimum temperature of the surface leaves on the ground during the night, and if we can in any way determine the dew-point on any still afternoon we can determine pretty accurately whether there is danger from frost during the coming night.

This can be done to a fair degree of accuracy with any hygrometer. The most common and probably the least expensive or complicated is the wet and dry thermometer. This instrument consists of two ordinary thermometers registering alike, similarly exposed in the open air in the shade. The dry thermometer is intended to show the temperature of the air. The other, the wet thermometer, is so called because its bulb is covered with a thin piece of muslin from which a strip of wicking passes to a vessel containing rain-water. The water rises by capillary attraction and thus keeps the bulb constantly wet; hence the name, wet bulb. Now if the air be dry the evaporation will be rapid, and on account of the heat lost in evaporation this thermometer will show a lower temperature than the other. With a moist atmosphere the evaporation will be slow, the loss of heat small, and consequently there will be little difference in the readings of the two thermometers. After observing them, the dew-point can be determined by means of simple tables.

This method is all right where the warnings cannot be received from the Weather Bureau; but this frost-warning system is being greatly extended now, and we are establishing a number of centres to which the warnings are to be telegraphed from twelve to thirty-

six hours in advance. At these centres the frost-warning flag is to be displayed, and the information sent out to the surrounding neighborhoods and farms by whatever method is best adapted to the community.

Another question arises as to how to protect the crops from frosts after the warning is received. On the Cape and in other cranberry-growing districts the bogs are flooded and the crop saved.

The only practicable method for all other crops seems to be covering. Radiation goes on in straight lines, and when there is anything over the plant it will stop the radiation just as surely as an umbrella will stop the rays of the sun. This is why we do not fear a frost when it is cloudy, no matter how high the clouds are; and if clouds a mile or more high will prevent radiation, how much more will any covering which we can place over our crops, no matter if it is the finest cambric. Of course covering by cloth is not practicable on anything but the smallest lots, so in large fields or groves fires and smudges are built. This is practised to some extent in the Northwest in the wheat fields, and to considerable extent in the orange groves. Stove-like arrangements are used in some places, in which tar is burned. This makes a thick smudge which spreads slowly over the fields. The Connecticut Pomological Society passed resolutions at a recent meeting asking the State Agricultural Experiment Station to make some investigations on the value of smudges for protection from frosts. This station intends to take up the investigation during the coming season, and I am sure that much of value will be learned.

Our subject is so wide and great that we have been able to take up no point as completely as could be wished, and now there is no time to speak of the possibilities of electro-culture — stimulating plant life by electricity — to take up thunder-storms, hailstorms, and tornadoes, which are all very closely related, or to mention the immense addition to knowledge and science resulting from the work of the last two decades. Just look back twenty years and see how little we knew of the origin, extent, and probable course of the great storms which influence our weather for days at a time. But with all our present knowledge of the laws of storms, under which head is included all that relates to wind direction and force around and within the storm areas, and all that relates to the rate of travel of storms, we are still in the elementary stages of the science, with volume upon volume still lying opened before us.

Our Bureau, as almost all of you probably know, was, on July 1st, 1891, transferred to the United States Department of Agriculture, the leading department of our great government. This change places the affairs of the Bureau in the efficient hands of General Rusk, Secretary of Agriculture, and Professor M. W. Harrington, our new chief. As I have just shown you, the work of the service, almost from its organization, has been greatly in connection with and for the benefit of farmers and horticulturists, and now that we are a part of the Department of Agriculture its work in this direction will be greatly extended. This I am assured is the full intention and desire of the head officials of the Bureau, which is fully verified by their action thus far. Nothing will be spared by them to increase and extend the usefulness of the work of the Weather Bureau.

In conclusion, I wish to extend to all present, and to the public generally, a cordial invitation to visit the local office in the Post Office Building, where you will be heartily welcomed at all times. I thank you for your attention.

The Forecast Official being detained at his office the above paper was read by his assistant, J. Warren Smith, who also gave the answers to the questions which will be found in the discussion.

The lecture was illustrated by a series of weather charts showing the course of a heavy storm from its origin, over the great plains of Western British America, following its progress southeasterly through the Mississippi Valley to the Gulf of Mexico, thence passing over the Gulf States and the Atlantic States to the Gulf of St. Lawrence, with attending conditions every twelve hours during its course. There was another series of weather charts, showing another line of observations.

Discussion.

Leverett M. Chase expressed the great interest he had taken in the admirable lecture given today; the closing one of an exceedingly interesting series. The weather is a subject of the greatest importance to every one. He had been at the office of the bureau in this city several times, and derived much pleasure and benefit from each visit. He had received the daily weather-maps, and used them in his school to engage the interest of the boys in the study of meteorology, and found that they were ready to give earnest attention to the subject. They have prepared maps show-

ing the phenomena of a day's observations. He considered such study as exerting a moral as well as educational influence; it teaches the pupils to observe with accuracy and gives them habits of regularity in the performance of duties, as such observations, to be of any value, must be taken at definite times, and a careful record of them must be kept. He thought the schools should be furnished with some instruments for taking such observations.

Mr. Chase moved a vote of thanks to the Forecast Official for his instructive and valuable paper, which was passed unanimously.

In reply to a question from a lady, Mr. Smith said that more than eighty per cent of the storms visiting the United States pass either a little north or a little south of us, or directly over us. The northern edge of the Gulf Stream is the point of least resistance, and doubtless contributes its influence to concentrate storms over New England.

O. B. Hadwen said that on very pleasant days, when a warm breeze is blowing, many weather-wise persons will say: "This is a regular weather-breeder," and asked what is the reason for such a remark.

Mr. Smith replied that southerly winds, which bring those warm, fine days, spring up just as a storm is approaching. It is a mere coincidence. A warm south wind, apparently from the Gulf of Mexico, generally indicates the near approach of a storm.

Mr. Hadwen said that farmers are generally quite close observers of the weather. He could tell very certainly what the weather would be through the day, and sometimes for the next day. A predicted change would at times occur in the night. He remembered some persons who were experts at foretelling the weather. Sometimes coincident circumstances, occurring repeatedly, would be regarded as inevitably connected. He cited an instance: a certain hay-field was never mowed over but that the hay was wet down by a shower, and the neighbors generally mowed little on the day the grass on that field was cut, in view of the usual rainfall the next day.

Mr. Smith said that local prognostics are often very accurate, but not readily explainable. Others may be shown to have close connection with the coming change. A red sunset shows that the air is well filled with moisture, which will generally form a heavy dew during the night. But a red sunrise shows that the

water is still in the atmosphere, and it is liable to produce a shower, and perhaps form the beginning of a longer rainfall. The flying of bats is an indication of pleasant weather the next day. Probably other animals are affected.

President Spooner spoke of the white frost on the sash of a cold frame in the morning being followed by a storm within twenty-four hours.

Oliver R. Robbins recollected two instances when the ground was frozen, yet tender vegetation escaped injury. The first occurred June 1, 1884. The ground was frozen half an inch deep; he had beans growing at that time. and they were not injured. There was no dew that night — or rather morning. The next case was on the morning of October 12, 1891, when ice, one-sixteenth of an inch thick, was formed on a shallow pool of water near the house, but no damage was done, even to the tenderest vegetation. Mr. Robbins also stated that on the 11th of September, 1885, he found the leaves of plants were completely coated with ice, yet they all escaped injury. He asked what reason could be given for such exceptions to a general rule.

Mr. Smith could not account for these facts.

Mr. Chase cited the flight of swallows, old dogs' rheumatism, and the activity of earth-worms as portents of approaching rain. He had found the earth-worms very interesting; they can be tamed, and he had learned that they have preferences in food.

President Spooner inquired what they preferred, and how they ate their food.

Mr. Chase had learned that worms greatly enjoy lettuce, among vegetable foods, and raw beef-steak of the animal list. They have no regular mandibles, but secrete an acid which quickly dissolves meat, when they can easily take it. They can take some things undissolved, and have a stomach which contains a grinding appliance for reducing such material. This part of their digestive apparatus is in the ring, sometimes called the "knot," in their bodies. He thinks they live a long time; he has some that are three years old.

A lady asked Mr. Smith if the wind, as he had said, blows towards the storm, why it does not blow the storm away.

Mr. Smith replied that heat expands the air. This renders it relatively lighter, and it is forced upward by the denser air all around, which rushes in to take its place and restore the

equilibrium. A storm has a general movement towards the north-east, in common with the whole volume of the atmosphere. He thought the temperature of the month of March had been low, but not much below the normal average. Great attention is now paid to the weather by cultivators of the soil, as well as by others. Forecast officials do sometimes make mistakes, and these are sure to be noticed and criticised by all classes.

Mr. Chase remarked that as this was the last of the meetings for discussion this season, and the series had proved so interesting and profitable — indeed, he considered these meetings the most important means of promoting the objects of the Society — he thought the members of the Society should manifest their appreciation by a vote of thanks to the Committee on Discussions, who had so ably and successfully arranged the programme for the meetings this year. He therefore moved that such action be taken, which, being promptly seconded, was unanimously adopted.

Experiment Station Reports Wanted.

The Massachusetts Horticultural Society is endeavoring to collect complete sets of the Bulletins and other publications of all the Agricultural Experiment Stations in the United States and Canada. Those named below are wanting, and any person having a spare copy will confer a favor by addressing the Librarian of the Society, Horticultural Hall, Boston.

A considerable number of duplicates are on hand, which will be exchanged for any of those in which the Society is deficient.

Alabama (Ag. and Mech. College Station). — Bulletins 1, 2, 3, 5, and 6 of First Series (1887), and 1 of Second Series (1888). Third Annual Report.

Arkansas. — Bulletins 1 and 4.

California. — Bulletins 1, 2, 3, 5, 50, 66.

Colorado. — Bulletin 3. Third Annual Report.

Connecticut (New Haven Station). — Bulletins 1 to 67, inclusive. Annual Reports for 1877 to 1883, inclusive.

Indiana (Purdue Univ. School of Ag.). — Bulletin 1. College Reports 1 to 14, inclusive.

Kentucky. — Bulletin 10.

Maine. — All bulletins later than No. 3 of Second Series. All Annual Reports previous to 1886–7.

Maryland. — Bulletins 7 and 13.

Massachusetts (Hatch Station). — Meteorological Bulletin 5.

Minnesota. — All Reports previous to the Biennial Report for 1885 and 1886.

Missouri. — Bulletins 9, 13, 15, 16, 17, 19, 20, 22, 25, 26, 28, 29, and 33 of Old Series.

New Jersey. — Bulletins 1, 4, 5, 15, 27, and 28.

New York (Geneva). — All Bulletins of Old Series.

North Carolina. — Bulletins 1 to 56, inclusive, and 75. Meteorological Division, Bulletin 2.

Ohio. — All Bulletins of First Series.

South Carolina. — All Bulletins of Old Series. Third Annual Report.

Tennessee. — All Bulletins of Old Series (beginning in 1882 and ending in 1887).

Texas. — All Bulletins of Old Series.

Vermont. — Bulletin 3.

Ontario Ag. College, Experimental Farm. — Bulletins 2, 3, 18, and 47. 1st, 2d, and 12th Annual Reports.

Ottawa, Ont., Central Experimental Farm. — All Annual Reports previous to that for 1888. Also, Dairy Bulletin 2.

Toronto, Ont., Bureau of Industries. — Bulletins 1 to 21, inclusive.

TRANSACTIONS

OF THE

Massachusetts Horticultural Society,

FOR THE YEAR 1892.

PART II.

BOSTON:
PRINTED FOR THE SOCIETY.
1893.

☞ SEE LAST PAGE OF COVER.

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TRANSACTIONS

OF THE

Massachusetts Horticultural Society.

BUSINESS MEETING.

SATURDAY, April 2, 1892.

A duly notified Stated Meeting of the Society was holden at eleven o'clock, the President, WILLIAM H. SPOONER, in the chair.

O. B. Hadwen, Chairman of the Committee appointed at the meeting on the 7th of November, 1891, to prepare a memorial of the late P. M. Augur, reported as follows:

By the decease of the late Phineas M. Augur, of Middlefield, Conn., this Society has lost one of its prominent and valuable members.

Mr. Augur had for a long time been interested and engaged in horticultural pursuits, and excelled in the cultivation of the apple, the pear, and the strawberry, introducing many new seedlings of the last, which were generally approved by cultivators. He was always interesting and instructive in his writings and discussions of subjects pertaining to pomology, and was largely instrumental in disseminating and bringing into prominence new fruits that promised well in the New England States.

The qualities that constitute the gentleman seemed particularly inherent in him. Modest, reserved, unpretending, he was yet ever ready to impart to others, in an easy and intelligent way, his rare fund of knowledge, acquired by many years of untiring devotion to the science and practice of horticulture. He served many years as Pomologist for the Board of Agriculture of the State of Connecticut, and was also a prominent member of the American Pomological Society, and Vice-President of it for his State.

His intercourse with men was marked by an agreeable and easy courtesy of manner, indicative of kindness to all. His devotion to horticulture was ever manifest during his life, and he died as he had lived, esteemed and beloved by all his associates.

The memorial was unanimously adopted, and it was voted that it be entered on the records, and that a copy be sent by the Secretary to the family of Mr. Augur.

The Secretary read a letter from John G. Barker, Chairman of the Committee on Gardens, in which he stated that he should be unable to be present and read the Report of the Committee on Gardens as he had hoped to do. On motion of John C. Hovey it was voted that the reading of the Report be postponed.

The following named persons, having been recommended by the Executive Committee as members of the Society, were on ballot duly elected:

JOHN A. PRAY, of Boston.
CORNELIUS E. MASTEN, of Roxbury.
JOHN F. NEWTON, of Roxbury.
HENRY C. COTTLE, of Boston.
F. A. PEUTTERICH, of Cambridge.
WALTER S. PARKER, of Reading.

EDWARD WINSLOW LINCOLN, of Worcester, Secretary of the Worcester County Horticultural Society, was, on recommendation of the Executive Committee, elected an Honorary Member of the Society.

Adjourned to Saturday, May 7.

BUSINESS MEETING.

SATURDAY, May 7, 1892.

An adjourned meeting of the Society was holden at eleven o'clock, the President, WILLIAM H. SPOONER, in the chair.

The Annual Report of the Committee on Gardens was read by John G. Barker, Chairman, accepted, and referred to the Committee on Publication.

Francis H. Appleton, from the Committee on Large or otherwise Interesting Trees, reported that the Committee had caused a list of such trees to be printed, at an expense of sixteen dollars, exceeding the amount authorized by the Society by six dollars. On motion of John G. Barker, the report was accepted and adopted.

The President, as Chairman of the Executive Committee, reported a recommendation that a piece of plate, of the value of twenty-five dollars, now owned by the Society, be offered in continuance of the Prospective Prize for Sweet Peas, offered in 1890 and 1891. On motion of Mr. Barker, it was voted that the report be accepted and the recommendation be adopted.

The Secretary read a letter from the Secretary of the Massachusetts Board of Education, stating that in accordance with the request of this Society the Board had published a Circular and Programme for Arbor Day, to be sent to the schools as a suggestion for a proper observance of the day.

The Secretary also read letters from Hon. Ephraim W. Bull, and Edward Winslow Lincoln, accepting the Honorary Memberships in the Society to which they had been elected, and thanking the Society therefor.

It was voted that all these letters be placed on file.

Adjourned to Saturday, June 4.

BUSINESS MEETING.

SATURDAY, June 4, 1892.

An adjourned meeting of the Society was holden at eleven o'clock, the President, WILLIAM H. SPOONER, in the chair.

O. B. Hadwen, Chairman of the Committee on Publication and Discussion, reported the following awards of prizes for the best reports by Awarding Committees:

First, for the Report of the Committee on Gardens, by John G. Barker, Chairman, ... $10 00

Second, for the Report of the Committee on Flowers, by Arthur H. Fewkes, Chairman, ... $8 00

Third, for the Report of the Committee on Window Gardening, by Mrs. H. L. T. Wolcott, Chairman, . 6 00

The report was accepted, and referred back to the Committee, for publication.

Mr. Hadwen also made a partial report in behalf of the Committee on the Columbian Exposition, stating that room had been reserved for contributions of fruits, flowers, and vegetables, from this State, and recommending that the Society take charge of such contributions from members and others. On motion of William C. Strong it was voted that the Committee have further time to act and report.

The President announced the decease of Rev. A. B. Muzzey, D. D., George W. Warren, and George W. Bond, and suggested the appointment of a committee to prepare a memorial of Rev. Dr. Muzzey, who had been more active in the Society's work than the other gentlemen. It was voted that such a committee be appointed by the Chair, and William C. Strong, Dr. E. Lewis Sturtevant, and John G. Barker were so appointed.

Mrs. Clara E. Gowing, of Boston,
having been recommended by the Executive Committee as a member of the Society, was on ballot duly elected.

The meeting was then dissolved.

BUSINESS MEETING.

Saturday, July 2, 1892.

A duly notified Stated Meeting of the Society was holden at eleven o'clock, the President, William H. Spooner, in the chair.

William C. Strong, Chairman of the Committee appointed at the last meeting to prepare a memorial of the late Rev. Artemas B. Muzzey, D. D., reported as follows:

The Committee appointed to draft an expression of the loss to the Society in the death of Rev. Artemas B. Muzzey, D. D., submit the following memorial:

For many years Mr. Muzzey has been an active member of this Society. He has not been known as a contributor to its exhibitions it is true, but he has been well known by the continued part he has taken in stimulating an interest in our discussions and exhibitions. For several years he served on the Committee on Publication and Discussion, and was active in sustaining our winter meetings. He firmly believed in the elevating influence of this Society, and by his earnest words he contributed in no small degree to the success of these meetings. It is fortunate, indeed, for the Society that we can have the aid of such men of culture and lovers of Nature, although they may not themselves be cultivators of the soil.

Mr. Muzzey was born in 1802 and was ordained as pastor in 1830. He continued to preach for more than forty-five years, preaching occasionally up to this year, when he ceased from his work at the ripe age of ninety years. He was the author of numerous books, sermons, and essays, which show him to have been a firm believer in the gospel of Jesus Christ. He was also active in promoting the interests of Harvard University, as well as other educational and historical associations. This Society hereby makes grateful acknowledgment of the value of his services in its behalf, continued, as they have been, through so many years to the close of his earthly life.

We recommend that the sympathy of the Society be expressed to the family of the deceased in view of their loss, and that the Secretary send to them a copy of this memorial, and also enter it upon the records of the Society.

Respectfully submitted by

WILLIAM C. STRONG,
E. LEWIS STURTEVANT,
JOHN G. BARKER,
} *Committee.*

The memorial was unanimously adopted.

The President, as Chairman of the Executive Committee, submitted the following report, recommending the passage of the vote therein contained:

Voted, That when unsolicited special prizes are offered by members of the Society or others, the amount of the prizes, either in money or its equivalent, shall be deposited with the Treasurer before the prize is accepted by the Society. Such offers shall be referred to the Committee on Establishing Prizes, and in order that they may appear in the regular Schedule, it is desirable that they shall be notified to the Committee on or before the first of November in each year.

The report was accepted and the vote was adopted.

The President also submitted the following further report from the Executive Committee:

The Executive Committee also recommend to the Society to appropriate sixteen dollars for the expense of printing the Report of the Committee on Large or otherwise Interesting Trees, being six dollars in addition to the amount which the Committee were authorized, at the meeting on the ninth of January, to expend.

The report was accepted and the appropriation was voted.

The Secretary read a letter from Col. Albert A. Pope, accompanied by "An Open Letter to the People of the United States," asking the influence of the Society in favor of an exhibit of road construction and maintenance at the World's Columbian Exposition in 1893. On motion, the subject was referred to the Committee appointed at the meeting on the second of January, in regard to the Columbian Exposition.

The following named persons, having been recommended by the Executive Committee as members of the Society, were on ballot duly elected.

JOHN CHARLES OLMSTED, of Brookline.
HENRY WILSON ROSS, of Newton Centre.
GEORGE FRANCIS PIERCE, of Dorchester.
EBED L. RIPLEY, of Hingham Centre.

Adjourned to Saturday, August 6.

BUSINESS MEETING.

SATURDAY, August 6, 1892.

An adjourned meeting of the Society was holden at eleven o'clock, the President, WILLIAM H. SPOONER, in the chair.

The Committee on the World's Columbian Exposition presented a report which was accepted as preliminary.

Agreeably to the Constitution and By-Laws, the President appointed the following named members a Committee to nominate candidates for officers and standing committees for the next year:

William C. Strong, *Chairman*.

E. W. Wood,	Patrick Norton,
Francis H. Appleton,	Nathaniel T. Kidder,
Charles N. Brackett,	Jackson Dawson.

The following named persons, having been recommended by the Executive Committee as members of the Society, were on ballot duly elected:

THEODORE H. TYNDALE, of Brookline.
Mrs. MARY MCDOWELL, of Boston.
E. B. MALLET, Jr., of Freeport, Maine.

Adjourned to Saturday, September 3.

BUSINESS MEETING.

SATURDAY, September 3, 1892.

An adjourned meeting of the Society was holden at eleven o'clock, Vice-President NATHANIEL T. KIDDER, in the chair.

William C. Strong, Chairman of the Committee appointed at the last meeting to nominate candidates for officers and standing committees of the Society for the year 1893, reported a printed list, which was accepted. It was voted that the Committee be continued, and requested to nominate candidates in place of any who might decline before the election.

Mr. Strong also presented, from the same Committee, the following vote:

Voted, To recommend to the Society, that no member shall be a candidate for the office of President, beyond a second term.

This vote was laid on the table for consideration at the next meeting.

The Secretary read a letter from Charles Eliot, Secretary of the Trustees of Public Reservations, which, with accompanying circulars, it was voted to refer to the Executive Committee.

S. Waldo French, of Parley Vale, Jamaica Plain, having been recommended by the Executive Committee as a member of the Society, was on ballot duly elected.

The meeting was then dissolved.

BUSINESS MEETING.

Saturday, October 1, 1892.

A Stated Meeting of the Society, being the Annual Meeting for the choice of Officers and Standing Committees, was holden today at eleven o'clock, the President, William H. Spooner, in the chair.

The Secretary stated that the members of the Society had been duly notified of this meeting as required by the Constitution and By-Laws.

Agreeably to the Constitution and By-Laws the President appointed John C. Hovey, Rev. Calvin Terry, and Elijah W. Wood, a Committee to receive, assort, and count the votes given, and report the number. The polls were opened at seven minutes past eleven o'clock.

John B. Reardon, of Boston, was proposed by Azell C. Bowditch, as an Annual Member of the Society.

The following named persons, having been recommended by the Executive Committee as members of the Society, were on ballot duly elected:

JOHN SPENCER CLARK, of Boston.
FRANCIS W. HUNT, of Melrose.
DUDLEY F. HUNT, of Reading.
WILLIAM MILMAN, of Roxbury.
HENRY SPAULDING PERHAM, of Chelmsford.
WALTER H. KNAPP, of Newtonville.

The polls were closed at seven minutes past one o'clock, and the Committee to receive, assort, and count the votes, and report the number, reported the whole number of ballots to be seventy-three, and that the persons named on the ticket reported by the Nominating Committee, had a plurality and were elected.

The report was accepted, and the above named persons were, agreeably to the Constitution and By-Laws, declared by the presiding officer — the President having retired, and Vice-President Nathaniel T. Kidder having taken the chair — to be elected Officers and Standing Committees of the Society, for the year 1893.

Adjourned to Saturday, November 5.

BUSINESS MEETING.

SATURDAY, November 5, 1892.

An adjourned meeting of the Society was holden at eleven o'clock, the President, WILLIAM H. SPOONER, in the chair.

Warren E. Eaton, of Reading, and Ellis Peterson, Jr., of Jamaica Plain, were proposed by Leverett M. Chase, as members of the Society.

The President, as Chairman of the Executive Committee, reported a recommendation that the Society appropriate the following sums for prizes, for the year 1893:

For Plants,	$2,050
" Flowers,	2,200
" Fruits,	1,800
" Vegetables,	1,100
" Gardens, Greenhouses, etc.,	500
" Window Gardening, this sum to cover all expenses of the Committee, and to be paid through the regular channels,	250
Total,	$7,900

The report was accepted and, agreeably to the Constitution and By-Laws, was laid over for final action at the Stated Meeting on the first Saturday in January, 1893.

The following named persons, having been recommended by the Executive Committee, were on ballot duly elected members of the Society:

JOHN B. REARDON, of Boston.
Miss RUTH G. RICH, of Dorchester.
WALTER A. ROBINSON, of Roxbury.
FRANK W. STEARNS, of Newton.
WILLIAM H. MARTIN, of Dorchester.

The Secretary read a letter from Malcolm Dunn, of Dalkeith, Scotland, acknowledging the receipt of his Diploma as Corresponding Member of the Society, and thanking the Society therefor; he also presented letters of similar tenor from other Corresponding Members, all of which were ordered to be placed on file.

Adjourned to Saturday, December 3.

BUSINESS MEETING.

SATURDAY, December 3, 1892.

An adjourned meeting of the Society was holden at eleven o'clock, the President, WILLIAM H. SPOONER, in the chair.

Mrs. George M. Coburn, of Boston, was proposed by Mrs. Ellen M. Gill, as a Life Member of the Society, and Thomas Westwood, of Jamaica Plain, was proposed by John G. Barker, as an Annual Member.

The President, as Chairman of the Executive Committee, made a report from that Committee, recommending an addition to the appropriation for Prizes for Flowers, for 1893, of $200, making the whole amount for flowers $2400. This report was accepted, and agreeably to the Constitution and By-Laws, was laid over for final action until the Stated Meeting in January next.

Edmund Hersey, Chairman of the Committee on Large or otherwise Interesting Trees, read a report from that Committee.

Joseph H. Woodford, Chairman of the Committee of Arrangements, read the Annual Report of that Committee.

Charles N. Brackett, Chairman of the Committee on Vegetables, read the Annual Report of that Committee.

These three reports were severally accepted and referred to the Committee on Publication.

Arthur H. Fewkes, Chairman of the Committee on Flowers, read a partial report from that Committee, being the amount of awards made during the year 1892, which was accepted and referred to the Committee on Publication. Mr. Fewkes also asked further time to complete his report, which was granted.

E. W. Wood, Chairman of the Committee on Fruits, asked for further time to prepare his report, which was granted.

Mr. Wood, as Chairman of the Committee on Establishing Prizes, presented the Schedule for 1893, as regards Plants, Flowers, and Gardens, and stated the changes proposed in regard to Fruits and Vegetables. The report was accepted, with the alterations proposed by the Committee.

Frederick L. Harris, Chairman of the Committee on Plants, made a partial report from that Committee, being the amount of awards made during the year 1892, which was accepted and referred to the Committee on Publication. Mr. Harris also asked further time to complete his report, which was granted.

It was voted that when the meeting adjourned it should be for two weeks, and that the Secretary send a notice of the adjourned meeting to every member of the Society.

The following named persons, having been recommended by the Executive Committee as members of the Society, were on ballot duly elected:

WARREN E. EATON, of Roxbury.
ELLIS PETERSON, Jr., of Jamaica Plain.
EDGAR MCMULLEN, of Boston.
JAMES C. PORTER, of Wollaston.

Adjourned to Saturday, December 17.

BUSINESS MEETING.

SATURDAY, December 17, 1892.

An adjourned meeting of the Society was holden at eleven o'clock, the President, WILLIAM H. SPOONER, in the chair.

Robert Graham of Reading, was proposed by J. Woodward Manning as an Annual Member of the Society.

E. W. Wood, Chairman of the Committee on Fruits, read the Annual Report of that Committee. In this report the ravages of the tent caterpillar were spoken of, and also the effort made by the Newton Horticultural Society to destroy them, by offering prizes for the greatest number of belts of eggs collected by school children, was mentioned, and the suggestion was made that it might be expedient for this Society to petition the Legislature for a law compelling highway superintendents and owners of wild lands to destroy the wild cherry trees which are the principal breeding places of this insect.

President Spooner remarked that as this would probably be the last meeting of the Society over which he should preside, he wished to speak of the depredations of the tent caterpillar and of the necessity of concerted action for its extermination. He doubted whether such action could be secured without legislation to compel it, and suggested that the Society should petition the Legislature for a law compelling all owners of trees to destroy the caterpillars infesting them. The subject was felt to be of so much importance that a meeting was held last summer at the rooms of the State Board of Agriculture to consider it.

William C. Strong said that last spring the Newton Horticultural Society offered rewards for the collection of the eggs of the tent caterpillar, and a large number were collected by boys, who did a good work, but that Society felt that public action by the State government was necessary in regard not only to the tent caterpillar and canker worm, but the codling moth, the first two of which have been more injurious in past years.

Francis H. Appleton said that the Hatch Experiment Station, at Amherst, had sent fifty copies of the Bulletin relating to the Suppression of Insect Pests, to many village improvement societies, and that other societies could receive copies on application. He thought the wild cherry tree a capital trap for the tent caterpillar.

Mr. Wood said that the wild cherry tree provides breeding grounds from which trees kept clean by their owner are supplied. Opposite his grounds are several neglected old trees, and he has more tent caterpillars on one tree near those than on twenty-five other trees. The wild cherry also breeds black warts, such as destroy our plum trees. A law has been enacted in New York providing penalties for allowing such trees to stand, and the fines are enforced. The wild cherry tree is of no value commercially.

William E. Endicott said we all know that the tent caterpillar breeds on the wild cherry, but if all the wild cherry trees were cut down would the caterpillars be destroyed? He thought they would not; they are extending their range to pear and other trees.

Edmund Hersey agreed with Mr. Wood as to the injury caused by the wild cherry. He had seen them covered with warts. He was not prepared to say that we should have a law to cut them down, but they ought not to be allowed to become nuisances.

Mr. Strong said it was a fact, notwithstanding the effort made in Newton to destroy the eggs of the tent caterpillar (which certainly caused the destruction of an immense number), that in the orchard where the greatest number were collected the foliage was completely destroyed last summer, showing that a great number of eggs escaped. Mr. Strong moved the following vote:

Voted: That a committee of three, of which the President shall be Chairman, be appointed to consider the best method of exterminating the tent caterpillar, canker worm, and codling moth, with authority to employ counsel to draft a bill to effect these objects.

The vote was unanimously passed, and the President appointed as the other two members of the Committee, William C. Strong and Francis H. Appleton.

John G. Barker, Chairman of the Committee on Gardens, read the Annual Report of that Committee.

William E. Endicott, Chairman of the Library Committee, read the Annual Report of that Committee.

Arthur H. Fewkes, Chairman of the Committee on Flowers, read the Annual Report of that Committee.

Frederick L. Harris, Chairman of the Committee on Plants, read the Annual Report of that Committee.

Robert Manning read his Annual Report as Secretary and Librarian.

These six Annual Reports were severally accepted, and referred to the Committee on Publication.

The President read a letter from Frederick L. Harris, resigning the position of Chairman of the Committee on Plants, to which he had been re-elected for the coming year, and expressing his obligations to the members of that and other committees, and his wishes for their prosperity and that of the Society.

E. W. Wood said that he should not perform the duty which he was about to do, if he did not feel that Mr. Harris's determination was unalterable. He wished first to say that as a member of the Committee on Establishing Prizes, Mr. Harris's knowledge had been invaluable in arranging the Schedule, and in saying this he spoke the feeling of all the Committee. The utmost confidence was felt by all the Committees in his judgment. He then moved that Mr. Harris's resignation be accepted.

Joseph H. Woodford hoped that if Mr. Harris's time would not permit him to continue as Chairman, he would still remain a member of the Committee.

Mr. Harris replied that he had given the subject full consideration, and had determined not to accept a position on any committee.

The resignation was accepted, and on motion of Azell C. Bowditch, James Wheeler was elected to fill the vacancy in the Committee on Plants. It was voted that the Committee be authorized to choose a Chairman.

The meeting was then dissolved.

REPORT

OF THE

COMMITTEE ON PLANTS,

FOR THE YEAR 1892.

By FREDERICK L. HARRIS, CHAIRMAN.

I congratulate the Society upon the advance made during the past year in the excellence of the exhibitions of beautiful plants, collected to instruct and gratify the taste of those who visit our halls from time to time. Every Saturday from January to December has witnessed displays either of cut flowers in abundance, or some orchids or other attractive plants — both ornamental and useful — adapted to satisfy the increase of taste on the part of the public, and also to meet the demands of amateurs who may be desirous of having a supply of decorative and flowering plants during the winter season. And here I will mention a few peculiarly adapted for general culture. Notably the following orchids, viz.: Cattleyas, Dendrobiums, Odontoglossums, Calanthes, Cœlogynes and Cypripediums. Most of these are winter blooming, and of easy culture, requiring a night temperature of not lower than 50°. A few of each of the above would supply the grower with these beauties from November until May.

Many lovers of this class of plants believe they cannot be grown under ordinary conditions; but such, however, is not the fact; any one growing roses can grow these orchids successfully, provided that a separate house can be given them during the summer months.

We believe the taste for decorative and flowering plants is on the increase, and it is expected that the exhibits from time to time should convey to the observer the proof of a higher order of

culture. But even this is not all that is required,— skilful grouping is most essential; it is when he sees this that the artist with his pencil delights to revel, and lovers of plants and flowers to while away happy hours.

The first group of plants — Orchids and Ericas — was sent from John L. Gardner's collection, January 2. It was a pretty good commencement for what was to follow later on.

January 9. John L. Gardner exhibited a nice plant of *Cattleya Percivaliana*, and was awarded a Silver Medal.

The Calla, Little Gem, exhibited January 16, by Joseph Tailby, received a Certificate of Merit.

January 30. We had another group of orchids from John L. Gardner.

February 6. *Aphelandra aurantiaca* from Alexander Galbraith.

February 13. The Bussey Institution showed Hardy Cypripediums.

February 20. Francis B. Hayes sent two nice Eriostemons, and the Bussey Institution, Hardy Shrubs, forced.

February 27. John L. Gardner exhibited *Phaius grandifolius* and Cattleyas.

March 4. Thomas Cox brought four elegant Ericas.

SPRING EXHIBITION.

March 22, 23, 24, and 25.

Although opening with unfavorable weather a fair assemblage of superior plants was staged — Orchids, Azaleas, Cinerarias, Cyclamens, Hyacinths, and Tulips, with other well known spring flowering bulbs. The Orchids from E. W. Gilmore, always attract a crowd. His exhibit was very beautiful; the collection containing fine examples of Cattleyas, Cypripediums, Odontoglossums, *Miltonia cuneatum*, and *Ada aurantiaca*. A variety of *Odontoglossum Pescatorei* was awarded a Certificate of Merit. It was large and strikingly beautiful — shaded with deep pink.

Nathaniel T. Kidder had *Cypripedium villosum*, *Cymbidium Lowii*, and other orchids.

John L. Gardner sent a fine *Cattleya Trianæ*, *Phaius grandifolius*, Cœlogynes, and Phalænopsis.

Benjamin Grey's beautiful *Cœlogyne cristata alba*, and many varieties of *Dendrobium nobile* were highly appreciated.

The most prominent feature of the exhibition, however, was the beautiful groups of spring flowering plants; and first in order was the superb arrangement of Dr. C. G. Weld, containing beautiful Cinerarias, Hyacinths, Tulips, Acacias, and Cyclamens. These were really superior to any heretofore shown, and were greatly admired.

John L. Gardner formed a rich display with Eriostemons, *Chorizema cordata*, Boronias, Ericas, forced shrubs, and a grand display of Hyacinths, Tulips, Freesias, and Lily of the Valley.

From the Bussey Institution came Rhododendrons, Andromedas, Daphnes, Hardy Azaleas, and Ericas, with a few desirable spring blooming plants, well arranged.

Groups of plants came also from Arthur Hunnewell and Mrs. Mary T. Goddard.

Alexander Galbraith and William Patterson brought Tulips and Polyanthuses. The Dawson rose, exhibited by William C. Strong, came in for a fair share of praise, being profusely bloomed; its perfect hardiness makes it a valuable acquisition.

Edward Butler, as usual, was first with a specimen orchid, *Dendrobium nobile*. Five dollars was awarded; but when the size of plant and the profuseness of bloom — it having six hundred expanded flowers — are considered, twenty dollars would have been more appropriate. Mr. Butler was awarded a Certificate of Merit for a superb plant of *Odontoglossum nebulosum*.

Joseph H. White had it his own way with Indian Azaleas, there being no competition. The display contained some twenty plants, well bloomed; his Genistas, Spiræas, and Cinerarias, made a nice group.

A pretty feature connected with this show was the rock garden or rockery, arranged by Charles J. Dawson, of the Bussey Institution. It was filled chiefly with forced shrubs and hardy herbaceous plants and bulbs. It was exceedingly effective and very many encomiums were bestowed upon its artistic arrangement.

April 30. Among the choice orchids sent by John L. Gardner were *Cypripedium bellatulum*, *C. caudatum*, *Odontoglossum Sanderianum* and *Dendrobium Sanderianum*.

MAY EXHIBITION.

May 7.

In both classes of Pelargoniums Nathaniel T. Kidder had no competitor.

Dr. C. G. Weld staged eight fine Azaleas, and was awarded first in all classes.

In the exhibit of Calceolarias there was quite a bit of rivalry between the exhibitors; but the first prize went to John L. Gardner for six nicely grown plants, remarkable for color and peculiar markings.

The great attraction at this exhibit was the six magnificent Indian Azaleas, arranged in the centre of the hall, one of which, Decora, was eight feet high — a perfect pyramid, literally covered with its rich crimson flowers, and without the stiff and formal appearance usually seen in specimen Azaleas. The Gold Medal was awarded to John L. Gardner for it. For a superb specimen of *Cypripedium caudatum*, a First Class Certificate of Merit was given to Dr. C. G. Weld.

Benjamin Grey exhibited curious and striking Sarracenias, and Nathaniel T. Kidder brought fine Streptocarpuses.

May 21. A Certificate of Merit was awarded to John L. Gardner for *Cattleya Reineckiana*.

RHODODENDRON SHOW.

June 10.

The Shady Hill Nursery Company sent four, fine, standard Rhododendrons.

ROSE EXHIBITION.

June 22 and 23.

The prizes for the best two stove or greenhouse plants were awarded, first to Dr. C. G. Weld; second to Alexander Galbraith.

For the best Single Plant in bloom, the first prize was awarded to John L. Gardner for *Rhynchospermum jasminoides*; the second to Dr. C. G. Weld for *Stephanotis floribunda*.

John L. Gardner sent also a few choice hard wooded plants, which we think deserve recognition, and we would at the same time urge that more attention should be bestowed on this interesting class. E. W. Gilmore exhibited six orchids. These were much admired, as were also those of John L. Gardner. Mrs. Durant and E. W. Gilmore each exhibited three orchids. John L. Gardner and Mrs. Durant received the prizes for single specimens. All the above were grouped together and with a few ferns interspersed made quite an interesting display.

June 25. Dr. C. G. Weld made a creditable display of orchids.

July 2. John L. Gardner was awarded a Certificate of Merit for *Thunia Veitchiana*, a very desirable variety for its late blooming qualities. *Grammatophyllum Ellisii* was also shown by him.

August 13. Nathaniel T. Kidder sent nice pans of Achimenes, as did also John L. Gardner. Daniel Duffley showed fourteen pots of *Amaryllis Belladonna*.

August 25. H. H. Hunnewell sent a grand plant of *Hippeastrum reticulatum* with twenty-three spikes and one hundred fully expanded blooms. A Silver Medal was awarded for it.

ANNUAL EXHIBITION OF PLANTS AND FLOWERS.

September 6, 7, 8, and 9.

The Hunnewell prizes for hardy coniferous trees, were competed for by the Shady Hill Nursery Company and William C. Strong. Very many varieties of these plants are especially adapted for small gardens and cemeteries.

A pair of beautiful palms in tubs, from Joseph H. White; and a pair in fourteen-inch pots, from George A. Nickerson were really superb.

At the extreme end of the hall, George A. Nickerson, with a group of Palms, Crotons, Ferns, and other ornamental plants, formed a bank of foliage unsurpassed for effect. His Crotons, both large and small, were beautifully colored, and of course in all the Croton classes he was an easy winner.

In the class of six greenhouse and stove plants,— two Crotons admissible — Mr. Nickerson was again an easy winner. A noble plant of *Kentia Belmoreana* occupied a prominent position, and

with Adiantums, and other Ferns and low-growing plants, which formed a margin around the group, produced an effect that was simply grand.

George A. Nickerson exhibited a single plant furnished with small ferns for table decoration, as did also Nathaniel T. Kidder and John L. Gardner.

The group contributed by Mr. Kidder was very artistically arranged, and very elaborate. It contained grand specimens of *Phyllotœnium Lindeni*, Marantas, Dieffenbachias and other ornamental leaved plants. Superb plants of Ferns, Lycopodiums, Caladiums, and other genera were also shown.

Dr. C. G. Weld exhibited in various classes. His Dracœnas were especially fine, and with other ornamental foliage plants — Ferns, Crotons, Lycopodiums, and Caladiums — made a very pleasing display. John L. Gardner grouped some fine examples of stove and greenhouse plants. He also showed some Crotons in six-inch pots, nicely colored — and without color these plants are of no effect — and a small lot of orchids.

Mrs. A. D. Wood and Alexander Galbraith exhibited Cycads.

Joseph H. White's display of forty Palms, Cycads, Ferns, and Lycopodiums, arranged in the centre of the hall — the place of honor — made an imposing appearance. Many of these specimens would be creditable to an exhibition anywhere. In addition to the above group, Mr. White exhibited in various other classes.

A *Clematis paniculata*, exhibited by Fisher Brothers & Co., was much admired; few plants are so effective for late summer blooming, and at the same time so hardy.

Tree Ferns came only from John L. Gardner and George A. Nickerson.

Pitcher & Manda of Short Hills, N. J., sent a few nice orchids; among them a fine *Mormodes pardinum unicolor*, with two beautiful spikes; a Silver Medal was awarded for it.

A little group of palms and ferns, from W. H. Lincoln, filled a niche in the hall and was greatly admired, as was also a group of Orchids, Ferns, and Sarracenias from Benjamin Grey.

A superb plant of *Selaginella grandis* came from Nathaniel T. Kidder.

Siebrecht & Wadley of New York City, received a Certificate of Merit for *Dracœna Norwoodiensis*, and choice orchids and Nepenthes.

Forty plants from H. H. Hunnewell's houses included Palms, Aralias, Cycads, Ferns, and Lycopodiums. In the collection was a superb plant of *Licuala grandis*; also of *Areca furfuracea*. *Pritchardia Pacifica*, *Aralia Kerchovei*, *A. pulchra*, and the remarkable *Selaginella phragmaria*. These with Adiantums and other Ferns and Selaginellas formed a magnificent group; and had they been located in the upper hall — where they should have been — would have added very much more to the interest of the show.

CHRYSANTHEMUM EXHIBITION.

NOVEMBER 8, 9, 10, AND 11.

In commenting on this exhibition, satisfactory pecuniarily and otherwise, there is a point that requires earnest consideration, viz: the manner of training and tying for exhibition purposes. Everyone who witnessed this display must have gone away with the conviction that the use of stakes was to a certain extent altogether superfluous. The specimens exhibited from the Waban conservatories were most artistically done of any that have been brought before the public; and it is hoped that this lesson of superior training may be quite generally learned therefrom.

The twelve specimens shown by Walter Hunnewell have never been surpassed here, especially Louis Bœhmer — six feet in diameter — which created a decided sensation. It is a pink colored plumed variety, recently introduced from Japan, with flowers of good size and shape and makes a very handsome specimen for exhibition purposes. The following is a list of the other varieties in the group as furnished by Mr. Hunnewell's gardener, T. D. Hatfield.

WALTER HUNNEWELL'S GROUP OF CHRYSANTHEMUMS OF 1892. A SELECTION.

Mr. Walter Baker.— A low-growing, bush specimen, with flowers of orange yellow. This was introduced from Japan as one of the famous "Neesima" set. It is very handsome.

Ivory.— A neat specimen, of American origin, with flowers of the purest white.

Walter Hunnewell.— A fine orange-yellow flowered variety of American origin; it makes a very fine specimen.

G. Daniels.— A very fine variety for specimens; flowers very large, white; a stout, healthy grower, needing very few stakes. It is of French origin.

Mr. Bishop.— One of the very best incurved yellow Japanese, for bush specimens. It is a clean healthy grower and the flowers last a long time. American.

F. Hatfield.— A tall, strong growing American variety of the Japanese class; it makes specimens of the largest size; flowers clear pink.

W. H. Lincoln.— One of the "Neesima" set and unsurpassed as a deep yellow for bush specimens.

Mrs. Fottler.— Also of the "Neesima" group. Bright lilac pink; makes large flowers when well disbudded.

V. H. Hallock.— Recently imported from Japan. A new shade of color, flesh pink, and a new type; a good, healthy grower, making fine specimens.

Etoile de Lyon.— A French variety; the very best for bush specimens; blush pink; flowers of large size.

Cullingfordii.— A fine deep reflexed crimson; the color in this specimen was perfection. It is seldom that Cullingfordii has been exhibited in such fine form.

Yellow Ball.— Raised by Mr. H. A. Gane of West Newton, Mass.; it is one of the best varieties for decorative purposes, and preëminently a florist's variety. It is neat, bushy, and needs no stakes.

Tupelo.— A deep red Japanese variety, of very effective color in grouping, and makes a handsome bush specimen.

Stella.— A bright yellow pompon of stocky habit; a very neat and effective specimen.

Mme. Miellez. — A crimson-purple pompon which makes a very neat specimen.

Arthur Hunnewell came in for a fair share of merit. His group contained two varieties of superior excellence, W. A. Manda and Harry May. The prize for the best specimen Japanese went to Walter Hunnewell for Mabel Ward, and that for the best specimen Pompon to Arthur Hunnewell for Savannah.

Passing these we come to the six varieties, viz.: Domination, W. H. Lincoln, E. G. Hill, Mrs. E. D. Adams, Hicks Arnold, and W. H. Cannell, grown by Alexander Montgomery, the well

known manager of the Waban Conservatories. A well deserved gratuity of twenty dollars was awarded for them. It is unnecessary to comment on the above, more than to say that such wonderful plants were never before seen in Boston, and it is a question if their equals have appeared anywhere else.

Dr. C. G. Weld exhibited quite a number of well grown plants; among them one of Mr. J. Falconer, which is said to be superior to Louis Bœhmer, but here it did not prove to be so good.

Miss Mary S. Walker exhibited, in the class of twelve, a set of plants which added materially to the general effect.

The group of plants arranged for effect, and filling a space of not more than two hundred square feet, shown by John L. Gardner, deserves high commendation for size of bloom and general arrangement. The majority of these were grown in seven-inch pots; for decorative purposes, such are superior to those of larger size. The group contained the choicest kinds in cultivation.

A good position for an effective display added very much to the group of William H. Elliott, and although the plants were not large, the arrangement called forth genuine admiration. A few strings of asparagus, covering exposed pots, formed a pleasing additional feature.

Dr. C. G. Weld and Nathaniel T. Kidder were also exhibitors in this class. In their collections were choice examples of standards and other well grown plants, many of which equalled those exhibited by others for prizes. And here we would add that in several classes in which prizes were offered, there were no competitors; and that if the time and skill given to displays could have been concentrated on, say, six plants, as required by the Schedule, less money would have reverted to the Society. Francis Brown Hayes and the Bussey Institution were also competitors in this class.

S. C. Lawrence, a new exhibitor, brought fourteen nicely grown plants, both standards and dwarfs, not entered for competition. It is hoped he will favor the Society with further contributions.

Mrs. Mary T. Goddard sent a pretty assortment. Those of Hon. Joseph S. Fay — novelties, recently imported direct from Japan — were unequal to many varieties we already have. Another season of skilful culture may possibly develop something rich and rare.

December 10. George McWilliam sent quite a display of *Luculia gratissima*; and the Cambridge Botanic Garden, Robert Cameron, gardener, exhibited *Plumbago rosea*.

The Society's appropriation was . .		$2,050 00
Awards of Prizes	$1,424 00	
" " Gratuities	318 00	
" " Gold Medal . . .	75 00	
" " Three Silver Medals . .	15 00	
		$1,832 00
Balance unexpended . . .		$218 00

F. L. Harris,
A. C. Bowditch,
David Allan,
William Robinson,
} *Committee on Plants.*

PRIZES AND GRATUITIES AWARDED FOR PLANTS.

JANUARY 2.

Gratuities : —

John L. Gardner, Orchids and Heaths	$10 00
William W. Lunt, *Cypripedium Nova Ebor*	1 00

JANUARY 30.

Gratuity : —

John L. Gardner, Collection of Orchids	10 00

FEBRUARY 6.

Gratuity : —

Alexander Galbraith, *Aphelandra aurantiaca*	1 00

FEBRUARY 13.

Gratuities : —

Bussey Institution, Cypripediums	2 00
John L. Gardner, Violets	2 00
" " *Cattleya labiata*	1 00

FEBRUARY 20.

Gratuities : —

Francis Brown Hayes. Two Eriostemons	5 00
Charles Jackson Dawson, Hardy Shrubs, etc., forced	3 00

FEBRUARY 27.

Gratuity : —

John L. Gardner, *Phaius grandifolius* and Cattleyas	6 00

MARCH 5.

Gratuities : —

Thomas A. Cox, four plants of *Erica caffra*	3 00
William H. Lincoln, Azalea	1 00

MARCH 19.

Gratuity : —

Mrs. P. D. Richards, Southern Plants and Ferns	1 00

SPRING EXHIBITION.

MARCH 22, 23, 24, AND 25.

Theodore Lyman Fund.

INDIAN AZALEAS.— Six distinct named varieties, in pots, Joseph H. White	$20 00
ORCHIDS.— Ten plants in bloom, E. W. Gilmore	30 00
Second, John L. Gardner	25 00

Society's Prizes.

INDIAN AZALEAS.— Four distinct named varieties, in not exceeding ten-inch pots, Joseph H. White	12 00
Two distinct named varieties, Joseph H. White	6 00
Second, Nathaniel T. Kidder	4 00
Specimen plant, named, Joseph H. White,	8 00
Second, Nathaniel T. Kidder	6 00
Single plant, of any named variety, in eight-inch pot, Joseph H. White	5 00
Second, Nathaniel T. Kidder	4 00
ORCHIDS.— Three plants in bloom, Nathaniel T. Kidder	10 00
Second, Benjamin Grey	8 00
Single plant in bloom, Edward Butler	5 00
Second, John L. Gardner	4 00
Third, Benjamin Grey	3 00
STOVE OR GREENHOUSE PLANTS.— Specimen in bloom, other than Azalea or Orchid, named, Dr. C. G. Weld	8 00
Second, John L. Gardner	6 00
HARDY FLOWERING DECIDUOUS SHRUBS, FORCED.— Four, in pots, of four distinct species, named, Bussey Institution	5 00
Second, John L. Gardner	4 00
HARDY FLOWERING EVERGREEN SHRUBS, FORCED.— Four, of four distinct species, Bussey Institution	5 00
CYCLAMENS.— Ten plants in bloom, Dr. C. G. Weld	8 00
Second, Mrs. Mary T. Goddard	6 00
Three plants in bloom, Dr. C. G. Weld	4 00
Single plant in bloom, Dr. C. G. Weld	3 00
Second, Dr. C. G. Weld	2 00
Third, Mrs. Mary T. Goddard	1 00
HARD WOODED GREENHOUSE PLANTS.— Four, in bloom, John L. Gardner	8 00
Second, Dr. C. G. Weld	6 00
POLYANTHUSES.— Ten plants, Fancy and Gold Laced, William Patterson	5 00

CINERARIAS.— Six varieties in bloom, in not over nine-inch pots, Dr. C. G. Weld	$8 00
Second, Dr. C. G. Weld	6 00
Three varieties in bloom, in not over nine-inch pots, Dr. C. G. Weld	5 00
Second, Dr. C. G. Weld	4 00
Single plant in bloom, Dr. C. G. Weld	3 00
Second, Dr. C. G. Weld	2 00

Special Prize, offered by R. & J. Farquhar & Co.

LILIUM HARRISII.— Two pots, Frederick Palmer, a piece of plate, value	15 00

Special Prize for Florists only.

GENERAL DISPLAY OF SPRING BULBS.— All classes, Warren Ewell	12 00

Regular Prizes.

HYACINTHS.— Twelve distinct named varieties, in pots, one in each pot, in bloom, Dr. C. G. Weld	10 00
Second, John L. Gardner	8 00
Third, Nathaniel T. Kidder	6 00
Six distinct named varieties, in pots, one in each pot, in bloom, Nathaniel T. Kidder	6 00
Second, Dr. C. G. Weld	5 00
Third, John L. Gardner	4 00
Three distinct named varieties, in pots, one in each pot, in bloom, Dr. C. G. Weld	4 00
Second, Nathaniel T. Kidder	3 00
Third, John L. Gardner	2 00
Single named bulb, in pot, in bloom, Nathaniel T. Kidder	2 00
Second, John L. Gardner	1 00
Three pans, not to exceed twelve inches, ten bulbs of one variety in each pan, Dr. C. G. Weld	10 00
Second, Alexander Galbraith	8 00
Third, John L. Gardner	6 00
Two pans, not to exceed twelve inches, ten bulbs of one variety in each pan, Dr. C. G. Weld	8 00
Second, Alexander Galbraith	6 00
Third, Nathaniel T. Kidder	5 00
Single pan, not to exceed twelve inches, with ten bulbs of one variety, Dr. C. G. Weld	5 00
Second, Nathaniel T. Kidder	4 00
Third, Charles V. Whitten	3 00
TULIPS.— Six eight-inch pans, nine bulbs in each, in bloom, Warren Ewell	5 00
Second, Alexander Galbraith	4 00
Third, John L. Gardner	3 00

Three eight-inch pans, nine bulbs in each, in bloom, Warren Ewell	$4 00
Second, Arthur Hunnewell	3 00
Three ten-inch pans, twelve bulbs of one variety in each pan, John L. Gardner	6 00
Polyanthus Narcissus.— Four seven-inch pots, three bulbs in each, in bloom, Bussey Institution	6 00
Second, Dr. C. G. Weld	4 00
Jonquils.— Six six-inch pots, the number of bulbs in each to be at the discretion of the grower, in bloom, Warren Ewell	3 00
Second, Bussey Institution	2 00
Lilium Harrisii.— Three pots, not exceeding ten inches, Dr. C. G. Weld	8 00
Second, William Patterson	6 00
Lily of the Valley.— Six six-inch pots, in bloom, John L. Gardner	5 00
Second, Warren Ewell	4 00
Third, Arthur Hunnewell	3 00
Anemones.— Three pots or pans, Dr. C. G. Weld	5 00
Second, Nathaniel T. Kidder	4 00
Freesias.— Six pots, John L. Gardner	5 00
Second, Bussey Institution	3 00
Roman Hyacinths.— Six eight-inch pans, ten bulbs in a pan, John L. Gardner	5 00
Second, Bussey Institution	4 00

Gratuities : —

Bussey Institution, Rockery	30 00
E. W. Gilmore, Orchids	12 00
Edward Butler, four Orchids	8 00
Benjamin Grey, Orchids	5 00
Norton Brothers, Orchids, Palms, etc.	10 00
William Patterson, Bulbs, Phaius, etc.	5 00
Francis Brown Hayes, Collection of Plants	10 00
Bussey Institution, Azaleas, etc.	5 00
Arthur Hunnewell, Plants	5 00
Joseph H. White, Plants — Cinerarias, Genistas, and Spiræas	5 00
Mrs. Mary T. Goddard, Plants	3 00

April 2.

Gratuity : —

John L. Gardner, Collection of Plants	2 00

April 9.

Gratuities : —

George B. Gill, Rose and Pæony, in pot	2 00
George M. Anderson, *Spiræa compacta*, var. *aurea-reticulata*	1 00

APRIL 30.

Gratuity : —

John L. Gardner, eleven Orchids	8 00

MAY EXHIBITION.

MAY 7.

PELARGONIUMS.— Four named Show or Fancy varieties, in pots, in bloom, Nathaniel T. Kidder	$8 00
Six named Zonale varieties, in pots, in bloom, Nathaniel T. Kidder	6 00
INDIAN AZALEAS.— Six plants, in pots, named, Dr. C. G. Weld	12 00
Single specimen, Dr. C. G. Weld, Prince Albert	5 00
Second, Dr. C. G. Weld, Mattapan	4 00
CALCEOLARIAS.— Six varieties, in pots, John L. Gardner	8 00
Second, Miss Mary S. Walker	6 00
Single plant, John L. Gardner	3 00
Second, Miss Mary S. Walker	2 00

Gratuities : —

John L. Gardner, Collection of Orchids	5 00
William C. Strong, Collection of plants for the Stage	5 00
Benjamin Grey, Collection of Sarracenias, Amaryllis, and Rhododendrons	8 00
Joseph H. White, Collection of Calceolarias, and four Spiræas	3 00
Nathaniel T. Kidder, Streptocarpus in variety	2 00
Alexander Galbraith, *Clianthus Dampieri*	1 00

MAY 14.

Gratuity : —

John L. Gardner, *Dendrobium thyrsiflorum*, *Cattleya Skinneri*, and two Pelargoniums	5 00

MAY 21.

Gratuity : —

John L. Gardner, five Orchids	3 00

RHODODENDRON SHOW.

JUNE 10.

Gratuities : —

John L. Gardner, six Orchids	5 00
Shady Hill Nursery Co., four standard Rhododendrons	5 00
Nathaniel T. Kidder, Seven Pelargoniums	3 00

ROSE EXHIBITION.

JUNE 22 AND 23.

STOVE AND GREENHOUSE FLOWERING PLANTS.— Two distinct named varieties, in bloom, no Orchid admissible, Dr. C. G. Weld	$15 00
Second, Alexander Galbraith	10 00
SPECIMEN PLANT IN BLOOM.— Named, other than Orchid, John L. Gardner, *Rhynchospermum jasminoides*	7 00
Second, Dr. C. G. Weld, *Stephanotis floribunda*	5 00
SPECIMEN FOLIAGE PLANT.— New and rare, other than Orchid, John L. Gardner	7 00
HARD WOODED GREENHOUSE PLANTS.— Three, of three distinct named varieties, in bloom, John L. Gardner	8 00
ORCHIDS.— Six plants, of six named varieties, in bloom, E. W. Gilmore,	25 00
Second, John L. Gardner	15 00
Three plants, of three named varieties, in bloom, Mrs. Pauline Durant	15 00
Second, E. W. Gilmore	10 00
Single specimen plant, named, John L. Gardner	8 00
Second, Mrs. Pauline Durant	6 00

JUNE 25.

Gratuity: —

Dr. C. G. Weld, Collection of Orchids	4 00

JULY 2.

Gratuity: —

John L. Gardner, *Grammatophyllum Ellisii*, and three Orchids	3 00

AUGUST 6.

Gratuity: —

John L. Gardner, *Odontoglossum vexillarium*, three varieties	3 00

AUGUST 13.

Gratuities: —

Nathaniel T. Kidder, ten plants Achimenes	7 00
John L. Gardner, Achimenes	2 00
Daniel Duffley, fourteen pots *Amaryllis Belladonna*	5 00

ANNUAL EXHIBITION OF PLANTS AND FLOWERS.

SEPTEMBER 6, 7, 8, AND 9.

Special Prizes, H. H. Hunnewell Fund.

HARDY CONIFEROUS TREES NOT NATIVES OF NEW ENGLAND.— Display in pots and tubs, named, Shady Hill Nursery Co.	15 00
Second, William C. Strong	10 00

Special Prizes, offered by the Society.

PALMS.— Pair, in pots or tubs not more than twenty-four inches in diameter, Joseph H. White	$12 00
Pair, in pots not more than fourteen inches in diameter, George A. Nickerson	8 00
Second, Joseph H. White	6 00

Regular Prizes.

GREENHOUSE PLANTS.— Display of Palms, Aralias, Cycads, Ferns, and Lycopods, not to exceed forty plants, in pots or tubs not to exceed twenty-two inches in diameter, H. Hollis Hunnewell	40 00
Second, Joseph H. White	30 00
Six greenhouse and stove plants, of different named varieties, two Crotons admissible, George A. Nickerson	30 00
Second, Nathaniel T. Kidder	25 00
Third, John L. Gardner	20 00
Single plant for table decoration, dressed at the base with living plants only, only one entry admissible, George A. Nickerson	8 00
Second, Nathaniel T. Kidder	6 00
Third, John L. Gardner	4 00
SPECIMEN FLOWERING PLANT.— Single named variety, John L. Gardner,	8 00
Second, Alexander Galbraith	6 00
ORNAMENTAL LEAVED PLANTS.— Six named varieties not offered in the collection of greenhouse plants, Crotons and Dracænas not admissible, Nathaniel T. Kidder	20 00
Second, Dr. C. G. Weld	15 00
Third, Joseph H. White	12 00
Single specimen, variegated, named, not offered in any collection, George A. Nickerson	6 00
Second, Nathaniel T. Kidder	5 00
Third, Joseph H. White	4 00
CALADIUMS.— Six named varieties, Nathaniel T. Kidder,	6 00
Second, Joseph H. White	4 00
FERNS.— Six named varieties, no Adiantums admissible, Nathaniel T. Kidder	10 00
Second George A. Nickerson	8 00
Third, Dr. C. G. Weld	6 00
ADIANTUMS.— Five distinct named species, George A. Nickerson	8 00
Second, Nathaniel T. Kidder	5 00
Third, Joseph H. White	4 00
TREE FERN.— Single specimen, named, not less than six feet in height, John L. Gardner, *Alsophila australis*	10 00
Second, George A. Nickerson	8 00
LYCOPODS.— Four named varieties, Nathaniel T. Kidder	5 00
Second, Dr. C. G. Weld	4 00

Dracænas.— Six named varieties, Dr. C. G. Weld	$8 00
Second, Nathaniel T. Kidder	6 00
Crotons.— Six named varieties, in not less than twelve-inch pots, George A. Nickerson	10 00
Six, in six-inch pots, George A. Nickerson	6 00
Second, Dr. C. G. Weld	5 00
Third, John L. Gardner	4 00
Cycad.— Single plant, named, Mrs. A. D. Wood	10 00
Second, Alexander Galbraith	8 00
Orchids.— Three plants. named varieties, in bloom, the second prize to John L. Gardner	6 00
Single plant, in bloom, the second prize to John L. Gardner	4 00

Gratuities: —

William H. Lincoln, Display of Palms and Ferns	10 00
Pitcher & Manda, Short Hills, N. J., Display of Plants	5 00
William Patterson, " "	5 00
Benjamin Grey, Orchids, Ferns, and Sarracenias	10 00
Fisher Brothers & Co , *Clematis paniculata*	3 00
William C. Strong, Cycad	2 00
Walter Hunnewell, Three Anemones	3 00
William C. Winter, Begonias	2 00
J. R. Andrews, Cotton Plants	1 00
Siebrecht & Wadley, New Rochelle, N. Y., Collection of Plants	5 00
Charles Storer, *Agave Victoria regina*	1 00
Nathaniel T. Kidder, *Selaginella grandis*	3 00

CHRYSANTHEMUM SHOW.

November 8, 9, 10, and 11.

Chrysanthemums.— Display of twelve named plants, any or all classes, distinct varieties, Walter Hunnewell	50 00
Second, Arthur Hunnewell	40 00
Third, Dr. C. G. Weld	30 00
Fourth, Miss Mary S. Walker	20 00
Group of Plants, arranged for effect, limited to two hundred square feet, John L. Gardner	40 00
Second, William H. Elliott	35 00
Third, Dr. C. G. Weld	30 00
Fourth, Nathaniel T. Kidder	25 00
Fifth, Francis Brown Hayes	20 00
Sixth, Bussey Institution	15 00
Six Incurved or Chinese, distinct named varieties, Walter Hunnewell	20 00
Specimen Incurved or Chinese, named variety, Arthur Hunnewell	6 00
Second, Dr. C. G. Weld	5 00
Third, Walter Hunnewell	4 00

Specimen Japanese, named variety, Walter Hunnewell	$6 00
Specimen Pompon, named variety, Arthur Hunnewell	5 00

Gratuities: —

Edmund M. Wood, Six Chrysanthemums	20 00
S. C. Lawrence, Fourteen Plants	15 00
Mrs. Mary T. Goddard, Display	10 00
Hon. Joseph S. Fay, Display	10 00

DECEMBER 10.

Gratuities: —

George McWilliam, Thirteen plants of *Luculia gratissima*	4 00
Robert Cameron, Botanic Garden, Cambridge, *Plumbago rosea*	2 00

SOCIETY'S GOLD MEDAL.

May Exhibition, May 7. John L. Gardner, *Azalea Decora.*

SOCIETY'S SILVER MEDALS.

January 9. John L. Gardner, *Cattleya Percivaliana.*
August 25. H. H. Hunnewell, *Hippeastrum reticulatum.*
Annual Exhibition of Plants, September 6–9. Pitcher & Manda, Short Hills, N. J., *Mormodes pardinum unicolor.*

FIRST-CLASS CERTIFICATES OF MERIT.

January 16. Joseph Tailby, Dwarf Calla, Little Gem.
Spring Exhibition, March 22–25. E. W. Gilmore, *Odontoglossum Pescatorei* var.
" " " Edward Butler, *Odontoglossum nebulosum*
May Exhibition, May 7. Dr. C. G. Weld, *Cypripedium caudatum.*
May 21. John L. Gardner, *Cattleya Reineckiana.*
July 2. John L. Gardner, *Thunia Veitchiana.*
Annual Exhibition of Plants, September 6–9. Siebrecht & Wadley, New Rochelle, N. Y., *Dracæna Norwoodiensis.*

REPORT

OF THE

COMMITTEE ON FLOWERS,

FOR THE YEAR 1892.

By Arthur H. Fewkes, Chairman.

As the season draws to a close and with it our annual series of exhibitions, we are reminded that duty requires us to report our doings for the current year.

Our exhibitions, while not presenting any extraordinary features, have been generally good, with many entertaining and instructive displays. Several things which have been steadily coming to the front, have been shown with increased interest, while some old favorites seem to be losing ground.

The displays of Herbaceous Plants have far excelled those of previous years, the interest in them being so marked, and the exhibits so excellent, that we have included a list of the various species and varieties shown in the collections which received the highest final award for the greatest number of first prizes during the season, thinking that it will be valuable for reference.

As to the introduction of new species, or improved varieties, the year has been singularly deficient, except in the case of the Chrysanthemum, in which there have been some notable additions.

The interest in the Sweet Pea seems to be still on the increase, and good mixed displays of it have been made. These flowers have become so important commercially as well as otherwise, that it seems as though more attention should be paid to their nomenclature. Our displays, while they are beautiful in their way, give

but very little idea of the different varieties and their correct names, and considering the very great improvements which are being made in the varieties, it would seem that the prizes we have been offering have not been such as would bring out the most instructive displays. With this in view a new prize has been added to the Schedule for 1893, which it is hoped will bring out full displays, arranged not so much for a general effect as to give us comparative collections of accurately named varieties. In this connection we have thought it would be a valuable addition to this report to introduce into it a complete list of known varieties, arranged so as to show those of a synonymous nature, and through the kindness of Rev. W. T. Hutchins, of Indian Orchard, we are enabled to present such a list.

Another class of plants which are claiming the attention of amateurs in no small degree, and are always highly appreciated by the general public when exhibited, are the Aquatics, more especially the Nymphæas and Nelumbiums. Our displays of these the past season have been excellent, and we predict that the time is not far distant when exhibitions composed entirely of aquatics and allied plants will be practicable.

The Cannas are also making a place for themselves as flowering plants. The improvement that has been made in them within the last few years is wonderful. We have seen the flowers develop from the comparative insignificance of a few years ago, into the present gorgeous varieties with flowers larger than those of the Gladiolus. There certainly is a great future before this plant, and judging by the exhibits we have had of them this season, we may expect some grand displays as they become better known.

We cannot pass on to a consideration of our regular exhibitions, without special mention of the displays of Wild Flowers which have been made almost weekly during the season, commencing with the first flowers that make their appearance in the spring, and not ending until hard frosts have destroyed the latest species. We have had not only the flowers of our own immediate vicinity, but specimens of many species from localities ranging from Maine and New Hampshire to Florida and the far West, showing the wide-spread interest which is taken in this department. Their value should not be under-estimated, presenting as they do to botanical students an unequalled opportunity for comparison and study.

As a complete list of the exhibitors and awards to each forms a part of this report, we will not attempt to describe the exhibits in detail, but will only mention such as seem to be worthy of special notice as out of the ordinary line of displays.

The first exhibit of this kind which claimed our attention, was a new Cypripedium shown by Thomas Greaves, January 9, and to which we awarded a First Class Certificate of Merit. It is a variety of the old *insigne* and is named *Greavesianum*.

On each Saturday, from January 9, to the Spring Show on March 22, we had interesting displays of seasonable flowers, many of them of great excellence.

The forced flowering shrubs and herbaceous plants, from the Bussey Institution, should be specially mentioned, particularly the display of February 20, when beautiful sprays of *Exochorda grandiflora* were shown, proving the value of this shrub for florists' use, as it is one of the few which can be forced early, and requires only about four weeks in which to bring it into bloom.

Fine specimens of *Andromeda speciosa*, another valuable shrub for forcing, were also shown on this day by Jackson Dawson. He also exhibited on March 12, a new hybrid rose, the result of a cross between *Rosa rugosa* and Gen. Jacqueminot. It is a single flower of an intense Jacqueminot crimson color and strong fragrance. A First Class Certificate of Merit was awarded for this new variety.

SPRING EXHIBITION.

March 22, 23, 24, and 25.

Notwithstanding the inclement weather with which this show opened, the displays of cut flowers were fully equal to any previous exhibits, and in many instances much finer. As regards cut flowers, this exhibition was more of a Rose and Carnation show than a Bulb show; the display of the first far exceeded anything before attempted here.

Much interest centered around the prizes offered by the Waban Rose Conservatories, for twenty-four blooms of the Waban rose. These prizes were in the form of silver cups, which were valued at one hundred dollars and seventy-five dollars, respectively, the first being won by William H. Elliott and the second by Charles E. Holbrow.

There were grand displays of other varieties of roses, including Catherine Mermet, The Bride, Mme. de Watteville, Papa Gontier, Mme. Hoste, and Ulrich Brunner.

Carnations also were shown much more extensively than ever before, and made a beautiful and much appreciated exhibit. The classes for separate colors, twelve blooms of each, were interesting and instructive. The varieties winning the prizes were, for the best crimson, Ferdinand Mangold; for the best pink, The Princess; for the best scarlet, Hector; for the best white, Mrs. Fisher, and for the best yellow, Golden Triumph. Honorable Mention was awarded Sewall Fisher, for a rich pink seedling Carnation of much promise.

Among the miscellaneous displays, which were numerous, was a dried flower spike of the Cocorita Palm (*Attalea macrocarpa*) from Trinidad, exhibited by Siebrecht & Wadley, of New Rochelle, N. Y. It was nearly ten feet in length, and an interesting object. A First Class Certificate of Merit was awarded to the same firm for a new seedling Nepenthes in the way of *sanguinea*, it being the result of a cross between that species and the variety known as *Mastersii*. It had a very large and richly colored (deep red) pitcher.

At the Saturday shows during April, many interesting displays were made. April 9, Honorable Mention was awarded Joseph Tailby for seedling Carnations, numbered 2, 3, 4, and 6, which were quite promising.

MAY EXHIBITION.

May 7.

This always interesting show was fully equal to its predecessors, some things being better shown than usual.

The Tulips were excellent but not numerous. The Narcissuses were quite well represented although it was a little late for them. Several collections of Pansies were shown, including many fine flowers, but they did not average as good as the year previous.

The collections of Herbaceous Plants at this show were particularly good, comprising many rare species.

Native Plants were shown by E. H. Hitchings and Mrs. P. D. Richards; their collections received the usual amount of admiration.

Many of the miscellaneous displays were excellent, but there were none which we can single out from the rest as remarkable.

There were many meritorious displays made on the Saturdays from May 14 to June 4, inclusive.

May 21, Honorable Mention was awarded Lewis H. Farlow for a very fine variety of *Cattleya Mendelii*.

RHODODENDRON SHOW.

June 10 and 11.

This show was set for June 4, but owing to the lateness of the season it was postponed until the 10th, and was held open for two days.

Until the present year these shows have been held open for a few hours only, but owing to the importance they have assumed, it was thought best to extend the time and charge an admission fee. One hall has usually been sufficient to accommodate the entire exhibition, but the two scarcely sufficed to hold all that was brought in. The lower hall was devoted to miscellaneous exhibits, while the upper one was almost entirely filled with Rhodendrons and Hardy Azaleas. In this hall, the arrangement of Hardy Azaleas, banked against a background of dark maroon curtains, was very effective and added greatly to the general effect of the exhibition.

With few exceptions the flowers in the upper hall were contributed by three gentlemen, H. H. Hunnewell, John L. Gardner, and Francis Brown Hayes.

The beautiful sterling silver vase, offered by Mr. Hayes, as a prize for fifty trusses of Rhododendrons of not less than twelve hardy varieties, was won by John L. Gardner with a superb collection of trusses, conspicuous among which were the varieties:

Alexander Dancer,
Caractacus,
Chancellor,
Everestianum,
Giganteum,
H. H. Hunnewell,
H. W. Sargent,
James McIntosh,
Lady Claremont,
Lord John Russell,
Minnie,
Purpureum elegans,
Purpureum grandiflorum,
The Queen.

Tender varieties were shown in great perfection and profusion, entirely eclipsing all previous attempts in this line.

Hardy Azaleas have never been shown so extensively before, but lose much in effect unless they are shown in large branches with numerous trusses.

In the lower hall, while the effect was not so striking, there was perhaps, more of general interest to the owner of an ordinary garden or grounds. Here were displayed the collections of herbaceous plants, flowering trees and shrubs, German Irises, Pyrethrums, Carnations, native plants, and a great variety of other flowers.

The exhibitors of Herbaceous Plants staged some remarkably fine specimens and many rare species.

Among the other very interesting displays of flowering trees and shrubs, was a collection from Jackson Dawson of the Arnold Arboretum, which included twenty-three varieties of Weigela.

James Comley was awarded a Silver Medal for his beautiful white seedling Rhododendron, Mrs. Grover Cleveland; and Thomas C. Thurlow, a First Class Certificate of Merit, for the Tricolor Beech, bearing the nursery name of *Fagus purpureus tricolor*. This is as beautiful in foliage as a croton, being variegated in shades of rose.

ROSE SHOW.

June 22 and 23.

It was also found necessary to postpone this show one week later than the time set, on account of the lateness of the season, which could hardly have been worse for the production of fine Roses. The unusually cold weather in April and the extremely hot days just previous to the exhibition, seemed to deprive the roses of vitality, and consequently, as to quality, we had a very poor showing of Roses from this locality. Those shown by Hon. Joseph S. Fay, of Wood's Holl, however, were a welcome exception to the rule, being of admirable quality. Among them were four new ones of much promise, viz.: Marchioness of Dufferin, Margaret Dickson, Jeannie Dickson, and T. W. Girdlestone.

Sweet Williams were extensively shown, but there was only one exhibitor of Herbaceous Pæonies, it being much too late for these flowers. Tuberous Begonias were entirely absent.

Among the miscellaneous displays of flowers there were many fine exhibits, especially the Herbaceous Plants from Rea Brothers, and the Botanic Gardens; the *Andromeda speciosa* and Syringas from Jackson Dawson; the displays of Rhododendrons and Pæonies from Francis Brown Hayes, and the Foxgloves from Alexander Galbraith.

Jackson Dawson was awarded a First Class Certificate of Merit, for a seedling Philadelphus, with a very large, pure white, and very sweet-scented flower.

The weekly summer shows, between the Rose Show and the Annual Exhibition, were full of interest, each Saturday bringing many exhibitors and an eager throng of visitors, always ready to express their appreciation of the exhibits placed in the hall for their inspection.

The general displays have differed but little from those of previous years, consequently there were but few special exhibits upon which we need to dwell.

July 23, Benjamin Grey made an exhibit of Nymphæas, among which *N. odorata sulphurea*, was prominent. It is one of Marliac's beautiful new hybrids, and a very valuable addition to this delightful class of plants, being hardy, fragrant, of beautiful color, and very free to bloom.

July 30 was Sweet Pea day, and a grand display was made of these flowers in bunches, arranged for effect only.

The Faxon Prize for Sweet Peas, although discontinued by the originator, was offered by the Society, on August 6, and was won by William Patterson, who, having taken the same prize last year, became entitled to the vase which was offered as the prize.

Another very attractive display at this exhibition was the collection of garden Lilies, from William C. Strong, including the following species and varieties:

Lilium auratum,
L. auratum rubrum vittatum,
L. auratum pictum.
L. auratum macranthum,
L. Wallichianum superbum,

The flowers of the last named variety — an introduction of last season — were from bulbs which remained in the ground over last winter, thus helping to prove its hardiness.

August 13, William E. Endicott was awarded a First Class Certificate of Merit, for a new seedling Gladiolus, named Helior, with color and markings unusually distinct.

August 20, James F. C. Hyde was awarded Honorable Mention, for a fine, soft pink seedling Phlox.

ANNUAL EXHIBITION.

SEPTEMBER 6, 7, 8, AND 9.

This was successful as far as the exhibits were concerned, although the greater portion of them were in miscellaneous collections, there being but little competition in the prize classes. There were three entries in the new class for Aquatic Plants, making altogether a very fine display.

Dr. R. H. Faunce took the First Prize with a finely grown collection, principally Nymphæas, the following species and varieties being represented, viz.:

Nymphæa alba candidissima.	*Nymphæa odorata Carolinensis.*
" *Devoniensis.*	" " *rosea.*
" *gigantea.*	" " *sulphurea.*
" *Laydekeri rosea.*	" *pygmæa.*
" *Marliacea albida.*	" *rubra.*
" " *carnea.*	" *Zanzibarensis.*
" " *chromatella.*	" " *azurea.*
" " *rosea.*	" " *rosea.*
" *odorata.*	

Nymphæa Laydekeri rosea received a First Class Certificate of Merit. It is a beautiful little flower of about eight petals, but they are so broad that the eight make two entire rows. The color is a rich rose, deepening as the flower ages. It is a hybrid between *pygmæa* and a pink variety and is said to be hardy.

Nymphæa gigantea is the great blue lily from Australia, one of the most beautiful and at the same time the most difficult to cultivate.

Nymphæa odorata Carolinensis was awarded Honorable Mention. It is one of the most promising new Nymphæas, the color being a pleasing light salmon.

The Second Prize was awarded to Benjamin Grey for an interesting collection including the following varieties, viz.:

Nymphæa alba candidissima.	*Nymphæa odorata carnea.*
" " "	" " *exquisita.*
rose colored var.	" " *rosea.*
" *dentata.*	" " *sulphurea.*
" *Devoniensis.*	" *pygmæa helveola.*
" *Greyæ.*	" *scutifolia.*
" *Marliacea albida.*	" *Sturtevanti.*
" " *carnea.*	" *Zanzibarensis.*
" " *chromatella.*	" " *azurea.*
" " *rosea.*	

Benjamin Grey was awarded a First Class Certificate of Merit, for his new seedling, *Nymphæa Greyæ*, a hybrid between *N. gracilis* and *N. scutifolia gigantea*. The color is a soft rosy carmine. He was also awarded Honorable Mention for a sport from *Nymphæa alba candidissima*, the color being a very pleasing cream pink.

In the class for *Victoria regia* there was no entry.

Fisher Brothers' display of Cannas, under the class calling for a collection of not less than ten varieties was magnificent and attracted much attention.

The prize day for Perennial Asters was September 17, and although it was fully a week too early for them, they were finely represented, George Hollis taking the first prize and Mrs. P. D. Richards, the second.

September 24, James S. Cowles was awarded a Silver Medal for a new seedling Canna, named Mrs. Fairman Rogers, it being a seedling raised from hand-fertilized seed of Mme. Crozy. It is a great improvement on its parent, the petals being much broader, with the yellow border fully one-quarter of an inch wide.

CHRYSANTHEMUM SHOW.

November 8, 9, 10, and 11.

In many respects this show must be considered one of the most successful of our Chrysanthemum Exhibitions. There were not as many flowers shown as last year, but they were all of fine quality, and many of them surpassed anything ever seen here before. While there were none shown in the class for fifty blooms there

were magnificent blooms in the class for six vases of six named varieties. The class which calls for the filling of the Society's large china vases is a good one and brought out some very beautiful flowers effectively arranged.

The classes which provide for one vase of ten blooms of a single color, on long stems, were well represented and were particularly valuable. The varieties staged in competition for them, were as follows, viz.: in

Red, first prize, a vase of Cullingfordii and Edwin Molyneaux; second, Cullingfordii.

Pink, first prize, V. H. Hallock; second, Ada Spaulding.

White, first prize, Domination; second, Miss Minnie Wanamaker; third, Domination.

Yellow, first prize, William H. Lincoln; second and third Harry E. Widener.

Any other color, first prize, Harry May; second, Mrs. Charles Wheeler; third, Violet Rose.

In the classes for Incurved, Japanese, Japanese Incurved, and Reflexed, there were several entries, and splendid blooms were entered, especially in the class for twelve Japanese Incurved, John Simpkins staging in this class some of the finest blooms in the hall. His varieties were:

Ada H. Leroy,
Eva Hoyt,
Harry May,
Mermaid,
Mrs. Charles Wheeler,
Mrs. Jerome Jones,
Mrs. J. Wanamaker,
Mrs. Maria Simpson,
Olga,
Roslyn,
Shenandoah.

Among the introductions of the current year, the most promising shown were:

Abbie Mendenhall,
Eva Hoyt,
Edward Hatch,
Harry May,
Marguerite Jeffords,
Miss Helyett,
Mrs. Jerome Jones,
Mrs. L. C. Madeira,
Mrs. Maria Simpson,
Olga,
Roslyn.

The classes for Incurved seemed to be neglected, E. A. Wood showing the only collection of well-grown flowers, his best

specimens being Mabel Ward, Hero of Stoke Newington, Mrs. Heale, Alfred Salter, Pietro Diaz, and L. C. Madeira.

Seedlings were not so extensively shown as in former years, but the quality was of a much higher grade.

The arrangement of the prizes by dividing them into classes by color is a good one, and should be continued.

In reds, the prize was awarded to George B. Gill, for Ox-blood. The best pink was shown by J. Eaton, Jr.; it was a lovely blush pink, named Carrie Bell. Snowflake, shown by John Simpkins, took the prize in whites. Pitcher & Manda, of Short Hills, N. J., took the first prize in yellows, with Mrs. F. L. Ames. The best in any other color than those specified was awarded to J. Eaton Jr., for a scarlet and gold, incurved Japanese, named Clarence.

First Class Certificates were awarded for the following seedlings:

To John Simpkins, for Snowflake, a very pure white Japanese.

C. D. Kingman, for Nemasket, a magnificent, very double, white Japanese.

George Hollis, for Silver Cloud, a large, reflexed, white, with a beautiful salmon shade in the centre.

E. G. Hill, for Maud Dean, a very large, incurved Japanese, of a beautiful, clear, rose pink color.

J. Eaton, Jr., for Carrie Bell, a fine, blush pink, incurved Japanese, and Clarence, a large, incurved Japanese with the face of the petals nearly scarlet in color and bright gold reverse.

Pitcher & Manda, of Short Hills, N. J., for Mrs. F. L. Ames, a very large and full Japanese, rich yellow in color, tinged orange in the centre.

Arthur H. Fewkes, for Shawmut, a large, full, double Japanese, clear yellow in color.

Nathan Smith & Son, of Adrian, Michigan, for Miles A. Wheeler, a bronze yellow, incurved Japanese.

Honorable Mention was awarded to George B. Gill, for Ox-blood, incurved Japanese, of a very deep maroon crimson.

Norris F. Comley, for Mrs. Norris F. Comley, a good, full double, red, reflexed variety.

E. G. Hill, for Mrs. J. W. Crouch, a fine, large, incurved Japanese; color a deep amaranth.

It seems unfortunate that our exhibitions are so deficient in Anemone flowered and Pompon Chrysanthemums, for good displays of them would be a great addition to our shows, and it is a great mistake to entirely neglect their cultivation.

Honorable Mention was also awarded to Sarah Fisher for seedling Carnations, and to Martin M. Cummings, for his white seedling Carnation, named Gov. Russell, a very promising white variety.

John Burton, of Philadelphia, showed his new rose, American Belle, a sport from American Beauty, and a decided improvement on that variety in color. A Silver Medal was awarded to him for this rose.

Nathaniel T. Kidder, having obtained the greatest number of first prizes throughout the season for Herbaceous Plants, became entitled to the Appleton Silver Medal, and the Shady Hill Nursery Co., to the Appleton Bronze Medal, for the next greatest number of first prizes in the same class.

The Committee have awarded during the year, one Appleton Silver Medal, one Appleton Bronze Medal, three Society's Silver Medals, eighteen First Class Certificates of Merit, and fourteen Honorable Mentions.

The amount appropriated for flowers in 1892 was	$2,200 00
The amount awarded in prizes and gratuities, including three silver medals and one bronze medal	$2,169 00
Unexpended balance	$31 00
The Committee have also awarded in Special Prizes	$225 00

All of which is respectfully submitted,

For the Committee,

ARTHUR H. FEWKES,

Chairman.

COLLECTIONS OF FORTY HERBACEOUS PERENNIALS EXHIBITED BY NATHANIEL T. KIDDER, DURING THE SEASON OF 1892.

First prizes were awarded for all these collections except that exhibited September 6–9, which received a third prize.

MAY 7.

Adonis vernalis.
Alyssum saxatile, var. *compactum.*
Anemone montana.
" *Robinsoniana.*
Anemonella thalictroides.
Arabis hirsuta.
Caltha palustris.
Corydalis nobilis.
Dodecatheon Meadia.
Doronicum Caucasicum.
Draba cuspidata.
Epimedium macranthum.
Erysimum rupestre.
Fritillaria sp.
Geum triflorum.
Hepatica triloba.
Hyacinthus orientalis.
Iris pumila.
" sp.
Muscari botryoides.
Narcissus muticus.
" *poeticus.*
Orobus vernus.
Pachysandra procumbens.
Phlox repens.
" *stellaria.*
" *subulata*
Primula veris.
Pulmonaria angustifolia.
Saxifraga carnea.
Stylophorum diphyllum.
Trillium grandiflorum.
" *sessile.*
" " *Californicum.*
Tulipa Gesneriana.
Uvularia grandiflora.
Vinca herbacea.
Viola canina var. *Muhlenbergii.*
" *cucullata* (with vars. *alba* and *variegata*).
Waldsteinia fragarioides.

JUNE 10 AND 11.

Ajuga Genevensis.
Allium Ledebourianum.
Amsonia Tabernæmontana.
Aquilegia (hybrids).
" *Olympica.*
Armeria dianthoides.
" *maritima purpurea.*
Asarum Canadense.
Astilbe Japonica.
Baptisia australis.
Cypripedium spectabile.
Dictamnus Fraxinella.
Digitalis purpurea.
Doronicum Pardalianches.
Erigeron Philadelphicus.
Geum coccineum.
Gypsophila repens.
Hemerocallis flava.

Hydrophyllum Virginicum.
Iris Germanica.
Lupinus polyphyllus.
Lychnis flos-cuculi fl. pl.
Oxalis violacea.
Pœonia.
Papaver orientale.
" *pilosum.*
Pentstemon diffusus.
Phlox amœna.
Polemonium cæruleum.
Primula Japonica.
Ranunculus acris fl. pl.
Salvia pratensis.
Silene maritima.
Smilacina racemosa.
Symphytum officinale variegata.
Thalictrum minus.
Tradescantia Virginica.
Verbascum Phœniceum.
Veronica rupestris.
Viola cornuta and var. *alba.*

JULY 2.

Agrostemma coronaria.
Ajuga Genevensis.
Anthemis tinctoria.
Betonica grandiflora.
Campanula nobilis.
" *persicifolia alba.*
Centaurea dealbata.
" *macrocephala.*
Centranthus ruber and var. *alba.*
Clematis Viorna.
Coreopsis verticillata.
Crucianella stylosa.
Delphinium (hybrids).
Dianthus barbatus.
" *Hispanicus.*
Digitalis purpurea.
Echinacea purpurea.
Erigeron glaucus.
Heracleum Persianum.
Iris Kœmpferi.
Lathyrus latifolius.
Lilium Canadense.
" *candidum.*
" *pomponianum.*
Lychnis Chalcedonica and var. *alba.*
Lychnis Haageana.
Lysimachia trisoidea.
" *vulgaris.*
Lythrum roseum superbum.
Malva Alcea.
Œnothera fruticosa.
" *speciosa.*
Pentstemon Digitalis.
Phlox Carolina.
Solidago Virgaurea Cambrica.
Spiræa Aruncus. ♀
" *palmata.*
Thalictrum angustifolium.
Trifolium Pannonicum.
Veronica incana.

JULY 30.

Achillea Ptarmica.
Aconitum variegatum.
Allium pulchellum.
Anthemis tinctoria.
Campanula rotundifolia.
Cassia Marilandica.

Cephalaria alpina.
Clematis Davidiana.
" *Pitcheri.*
Crucianella stylosa.
Cunila Maryana.
Delphinium (hybrids).
Echinops exaltatus.
" *Ritro.*
Euphorbia corollata.
Galium sp.
Gentiana asclepiadea.
Gypsophila acutifolia.
Helianthus multiflorus fl. pl.
Kniphofia triangularis.
Lathyrus latifolius.
Lepachys pinnata.
Leucanthemum uliginosum.
Lilium tigrinum.
Lychnis Haageana.
Lysimachia clethroides.
Lythrum roseum superbum.
Malva Alcea.
Monarda didyma.
" *fistulosa.*
Œnothera fruticosa.
Origanum vulgare.
Phlox paniculata.
Platycodon grandiflorum album.
Polygonum Sieboldi.
Rudbeckia grandiflora.
" *maxima.*
" *speciosa.*
Stokesia cyanea.
Verbascum nigrum.
Veronica fruticulosa.

SEPTEMBER 6, 7, 8, AND 9.

Anemone Japonica.
Aster Novæ-Angliæ.
" *spectabilis.*
Boltonia latisquama.
Campanula Carpatica.
Chelone Lyoni.
Clematis Pitcheri.
Coreopsis grandiflora.
Crucianella stylosa.
Delphinium dasycantha.
Eupatorium ageratoides.
" *altissimum.*
" *cœlestinum.*
Funkia subcordata.
Gypsophila acutifolia.
Helenium autumnale.
Helianthus multiflorus.
" " *fl. pl.*
Hibiscus flavescens.
" *Moscheutos.*
Lathyrus latifolius.
Lespedeza bicolor.
Lilium lancifolium.
Lobelia syphilitica.
Malva Alcea.
" *moschata alba.*
Mimulus cardinalis.
Monarda didyma.
Phlox paniculata.
Physalis Alkekengi.
Polygonum Sachalinense.
Pycnanthemum lanceolatum.
Pyrethrum uliginosum.
Rudbeckia speciosa.
Sedum spectabile.
Solidago Missouriensis.
" *rigida.*
Statice speciosa.
Verbascum Chaixii.
Vernonia Novæboracensis.
Veronica longifolia subsessilis.
Viola cornuta.

OCTOBER 4, 5, AND 6.

Aconitum autumnale.
Actinomeris squarrosa.
Allium stellatum.
Anemone Japonica var. Honorine Joubert.
Anemone Japonica rosea.
Aster sp.
" *Novæ-Angliæ.*
" *Tartaricus.*
Boltonia latisquama.
Campanula Carpatica.
" *Rapunculoides.*
Centranthus ruber.
Clematis Pitcheri.
Colchicum autumnale.
Coreopsis grandiflora.
Crocus speciosus.
Crucianella stylosa.
Delphinium (hybrids).
Echinops exaltatus.
Eulalia Japonica zebrina.
Eupatorium ageratoides.
" *cœlestinum.*
Gentiana Andrewsii.
Helenium autumnale.
Helianthus multiflorus fl. pl.
" *orgyalis*
" *tuberosus.*
Heuchera villosa.
Lespedeza bicolor.
Mimulus cardinalis.
Plumbago Larpentæ.
Polygonum amplexicaule var. *oxyphylla.*
Pyrethrum uliginosum.
Sedum spectabile.
Solidago Drummondi.
" *rigida.*
Tritoma Uvaria.
Verbascum nigrum.
Viola cornuta.
" *striata.*

LIST OF SWEET PEAS, COMPLETE TO DATE.

BY REV. W. T. HUTCHINS.

Those marked E. were sent out by Henry Eckford, of Wem, Shropshire, England.

Adonis.
Alba Magnifica.
Apple Blossom, E.
Black (Irvin Black) *Synonym* Bronze Prince.
Blanche Ferry, *Syn.* Blushing Bride.
Blue and Purple, *Syn.* Johanna Theresa.
Blue and Purple Striped.
Blue Bird.
Blue Edged.
Blushing Beauty, E., 1893.
Boreatton, E.

Butterfly.
Captain Clarke, *Syn.* Tricolor.
Captain of the Blues, E.
Cardinal, E.
Carmine Invincible.
Countess of Radnor, E.
Crown Princess of Prussia.
Delight, E.
Dorothy Tennant, E., 1892.
Duchess of Edinburgh, E.
Duke of Clarence, E., 1893.
Emily Eckford, E., 1893.
Empress of India, E.
Fairy Queen.
Firefly, E., 1893.
Gaiety, E., 1893.
Her Majesty, E., 1892.
Ignea, E., 1892.
Imperial Blue, *Syns.* Grand Blue, Mauve Queen, Laxton's Invincible Blue, Imperial Purple.
Indigo King, E.
Isa Eckford, E.
Lady Beaconsfield, E. 1893.
Lady Penzance, E., 1893.
Lemon Queen, E., 1892.
Miss Hunt, E.
Monarch, E.
Mrs. Eckford, E., 1892.
Mrs. Gladstone, E.
Mrs. Sankey, E.
Orange Prince, E.
Ovid, E. 1893.
Painted Lady, *Syn.* Nellie Jaynes.
Peach Blossom, E., 1893.
Primrose, E.
Princess Beatrice.
Princess of Wales, E.
Princess Victoria, E.
Purple.
Purple Brown, *Syn.* Zulu Chief.
Purple Prince, E.
Queen of England, E.
Queen of the Isles, *Syn.* Invincible Red Striped.
Queen Victoria.
Royal Robe, E., 1893.
Scarlet Invincible.
Scarlet Striped.
Senator, E.
Splendor, E.
Stanley, E., 1893.
The Queen, E.
Venus, E., 1893.
Vesuvius.
Violet Queen, *Syn.* Princess Louise.
Waverly, E., 1892.
White.

PRIZES AND GRATUITIES AWARDED FOR FLOWERS, 1892.

JANUARY 16.

Gratuity:—

Francis Brown Hayes, Display of Camellias	$3 00

JANUARY 30.

Gratuities:—

Francis Brown Hayes, Display of Camellias	2 00
Bussey Institution, Forced Shrubs and Plants	2 00

FEBRUARY 6.

Gratuity:—

Francis Brown Hayes, Display of Camellias	3 00

FEBRUARY 13.

Gratuity:—

Francis Brown Hayes, Display of Camellias, Orchids, Roses, etc.	3 00

FEBRUARY 20.

Gratuities:—

Francis Brown Hayes, Display of Camellias, etc.	2 00
Charles V. Whitten, Vase of La France Roses	2 00
Bussey Institution, Forced Shrubs	1 00
Mrs. E. M. Gill, Cut Flowers	1 00

FEBRUARY 27.

Gratuities:—

Francis Brown Hayes, Camellias, Orchids, etc.	2 00
Charles V. Whitten, Vase of Duchess of Albany Roses	2 00
William Patterson, Hybrid Perpetual and Tea Roses	1 00

MARCH 5.

Gratuities:—

Francis Brown Hayes, Camellias, Orchids, etc.	3 00
Bussey Institution, Forced Shrubs and Plants	2 00
Mrs. E. M. Gill, Pansies and Cut Flowers	1 00

MARCH 12.

Gratuities:—

Francis Brown Hayes, Camellias, Rhododendrons, etc.	$2 00
Charles E. Richardson, *Clivia Van Houteii*	1 00
Mrs. E. M. Gill, Cut Flowers	1 00

MARCH 19.

Gratuities:—

William H. Spooner, Hybrid Roses	1 00
Augustus P. Calder, *Anemone coronaria*	2 00
Mrs. P. D. Richards, Florida Plants	1 00

SPRING EXHIBITION.

MARCH 22, 23, 24, AND 25.

Special Prizes, offered by Waban Rose Conservatories.

HYBRID PERPETUAL ROSES.— Twenty-four blooms of Tea Rose, Waban, William H. Elliott, Plate, value	100 00
Second, C. E. Holbrow, Plate, value	75 00

Regular Prizes.

Six cut blooms, distinct named varieties, Mrs. W. E. Bright	4 00
Twelve cut blooms of Ulrich Brunner, Thomas H. Meade	10 00
Second, Charles V. Whitten	8 00
TENDER ROSES IN VASES.— Twelve blooms of Catherine Mermet, Waban Rose Conservatories	8 00
Second, Thomas H. Meade	6 00
Twelve blooms of Cornelia Cook, Waban Rose Conservatories	8 00
Twelve blooms of Duchess of Albany, Charles V. Whitten	8 00
Twelve blooms of Mme. de Watteville, Waban Rose Conservatories	8 00
Second, Montgomery Brothers	6 00
Twelve blooms of Mme. Hoste, Montgomery Brothers	8 00
Twelve blooms of Papa Gontier, Charles V. Whitten	8 00
Second, C. E. Holbrow	6 00
Twelve blooms of The Bride, Waban Rose Conservatories	8 00
Second, William H. Elliott	6 00
Best Tea Rose introduced since 1889, Waban Rose Conservatories, for Waban	4 00
PANSIES.— Forty-eight cut blooms, not less than twenty-four varieties, in the Society's flat fruit dishes, Denys Zirngiebel	4 00
Second, Mrs. E. M. Gill	3 00
VIOLETS.— Best collection of varieties, fifty blooms of each in a bunch, Nathaniel T. Kidder	4 00
Second, Alexander Galbraith	3 00

CARNATIONS.— Display of cut blooms, with foliage, not less than six varieties, in vases, Richard T. Lombard	$5 00
Second, William Nicholson	4 00
Third, H. K. Southworth	3 00
Twelve blooms of any named crimson variety, Paul Richwagen, for Ferdinand Mangold	3 00
Twelve blooms of any named pink variety, Galvin Brothers, for The Princess	3 00
Twelve blooms of any named scarlet variety, Galvin Brothers, for Hector	3 00
Twelve blooms of any named white variety, Galvin Brothers, for Mrs. Fisher	3 00
Twelve blooms of any named yellow variety, Richard T. Lombard, for Golden Triumph	3 00
CAMELLIAS.— Display of named varieties, cut flowers with foliage, not less than twelve blooms, of not less than six varieties, Francis Brown Hayes	4 00
Six cut blooms, of not less than four named varieties, with foliage, Francis Brown Hayes	3 00
CENTRE PIECE OR ARTISTIC DESIGN.— The last day of the Exhibition, Norton Brothers	8 00
Second, Mrs. A. D. Wood	6 00

Gratuities:—

Siebrecht & Wadley, New Rochelle, N. Y., Cut Orchids	6 00
E. Sheppard & Son, Cut flowers of *Dendrobium nobile*	2 00
Francis Brown Hayes, Rhododendrons and Orchids	3 00
J. Frank Curtis, Vase of Catherine Mermet Roses	2 00
Augustus P. Calder, Roman Anemones, *A. coronaria*	2 00
Arthur H. Fewkes, Spike of Clivia John L. Flanders	2 00
Bussey Institution, Forced Shrubs	4 00
Siebrecht & Wadley, cut Nepenthes	2 00
Mrs. A. D. Wood, Two vases of Cut Flowers	3 00
Mrs. E. M. Gill, Cut flowers	2 00

APRIL 2.

Gratuities:—

Francis Brown Hayes, Roses	3 00
" " " Rhododendrons and Violets	1 00

APRIL 9.

Gratuity:—

Francis Brown Hayes, Roses and Rhododendrons	5 00

APRIL 23.

Gratuities:—

Augustus P. Calder, Roman Anemones	$1 00
Mrs. P. D. Richards, Wild Flowers	1 00
E. H. Hitchings, " "	1 00

APRIL 30.

Gratuities:—

Mrs. P. D. Richards, Wild Flowers	1 00
E. H. Hitchings, " "	1 00

MAY 7.

TULIPS.— Twenty-four blooms, distinct named varieties, John L. Gardner	6 00
Second, Dr. C. G. Weld	4 00
HARDY NARCISSUSES.— Collection of not less than ten named varieties of blooms, in vases, John L. Gardner	6 00
Second, Dr. C. G. Weld	5 00
Third, Robert Manning	4 00
PANSIES.— Forty-eight cut blooms, not less than twenty-four varieties, in the Society's flat fruit dishes, Hon. Joseph S. Fay	5 00
Second, William Patterson	4 00
Third, Joseph H. White	3 00
HERBACEOUS PLANTS.— Forty bottles, Nathaniel T. Kidder	8 00
Second, Jacob W. Manning	6 00
BASKET OF FLOWERS.— Mrs. A. D. Wood	6 00
Second, Mrs. E. M. Gill	5 00
NATIVE PLANTS.— Collection not exceeding forty bottles, E. H. Hitchings	5 00
Second, Mrs. P. D. Richards	4 00

Gratuities:—

John L. Gardner, Tulips	3 00
Bussey Institution, Narcissuses and Tulips	2 00
Hon. Joseph S. Fay, Collection of Pansies	3 00
Dr. C. G. Weld, Hardy Primroses	2 00
Joseph H. White, Gloxinias	4 00
Francis Brown Hayes, Calceolarias	1 00
Isaac E. Coburn, Pelargoniums	2 00
E. Sheppard & Son, "	2 00
Rea Brothers, Spiræas and Astilbe	1 00
Mrs. A. D. Wood, Cut Flowers	2 00
Mrs. E. M. Gill, " "	1 00
Miss Wier, Native Plants	1 00

MAY 14.

Gratuities: —

Hon. Joseph S. Fay, Collection of Pansies	$3 00
Francis Brown Hayes, Calceolarias and Hardy Shrubs	3 00
Mrs. A. D. Wood, Cut Flowers	1 00
Mrs. P. D. Richards, Native Plants	2 00
E. H. Hitchings, " "	2 00

MAY 21.

Gratuities: —

Francis Brown Hayes, Cut Flowers and Shrubs	3 00
John L. Gardner, Late Tulips	1 00
Mrs. P. D. Richards, Wild Plants	2 00
E. H. Hitchings, " "	2 00

MAY 28.

Gratuities: —

Francis Brown Hayes, Flowering Shrubs and Cut Flowers	3 00
Jacob W. Manning, Herbaceous Plants	1 00
William C. Strong, Pæonies and Lilacs	1 00
Mrs. P. D. Richards, Wild Plants	2 00

JUNE 4.

Gratuities: —

Francis Brown Hayes, Rhododendron and Flowering Shrubs	5 00
Thomas C. Thurlow, Hardy Azaleas and Tree Pæonies	2 00
Jacob W. Manning, Collection of Herbaceous Plants	6 00
Rea Brothers, Herbaceous Plants	2 00
Benjamin D. Hill, " "	1 00
Mrs. A. D. Wood, Cut Flowers	1 00
Mrs. E. M. Gill, " "	1 00
Mrs. P. D. Richards, Wild Plants	1 00
E. H. Hitchings, " "	1 00

RHODODENDRON SHOW.

JUNE 10 AND 11.

Special Prize, offered by Francis Brown Hayes.

RHODODENDRONS. — For fifty trusses, not less than twelve Hardy varieties, John L. Gardner, a piece of plate, value	50 00

H. H. Hunnewell Premiums.

Twelve trusses distinct Hardy varieties, named, Francis Brown Hayes, a piece of plate, value.	20 00
Second, John L. Gardner, a piece of plate, value	15 00

Six distinct Hardy varieties, named, O. B. Hadwen	$10 00
Eighteen Tender varieties, named, Francis Brown Hayes	10 00
Six Tender varieties, named, " " "	5 00
Three Tender varieties, named, " " "	4 00
Single truss of any Tender variety, named, Francis Brown Hayes	2 00
HARDY AZALEAS. — From any or all Classes. — Fifteen named varieties, one cluster from a single bud each, Thomas C. Thurlow	8 00
Second, John L. Gardner	5 00
Twelve named varieties, one cluster from a single bud each, Thomas C. Thurlow	4 00
Six named varieties, one cluster from a single bud each, E. Sheppard & Son	3 00
Second, Benjamin G. Smith	2 00
Cluster of trusses, one variety, John L. Gardner	2 00
Second, Benjamin G. Smith	1 00

Society's Prizes.

GERMAN IRISES. — Six distinct varieties, one spike of each, Mrs. A. D. Wood	3 00
Second John L. Gardner	2 00
HARDY PYRETHRUMS. — Display, Dr. C. G. Weld	3 00
Second, Joseph H. Woodford	2 00
Third, John L. Gardner	1 00
HARDY FLOWERING TREES AND SHRUBS. — Collection of thirty species and varieties, named, cut blooms, Nathaniel T. Kidder	8 00
HERBACEOUS PLANTS. — Forty bottles, Nathaniel T. Kidder	8 00
Second, Shady Hill Nursery Co.	6 00
Third, Jacob W. Manning	4 00
BASKET OF FLOWERS. — Mrs. E. M. Gill	5 00
Second, Mrs. A. D. Wood	4 00
NATIVE PLANTS. — Collection, not exceeding forty bottles of named species and varieties, one bottle of each, E. H. Hitchings	5 00
Second, Mrs. P. D. Richards	4 00

Gratuities : —

Francis Brown Hayes, Collection of Rhododendrons	25 00
John L. Gardner, " " "	25 00
H. H. Hunnewell, Collection of Rhododendrons and Azaleas	25 00
Nathaniel T. Kidder, " " "	5 00
E. Sheppard & Son, Rhododendrons and Azaleas	3 00
Caleb W. Loring, " " "	3 00
O. B. Hadwen, Rhododendrons	2 00
Joseph Clark, Rhododendron Sappho, and *Clematis Montana*	3 00
Thomas C. Thurlow, Hardy Azaleas and Weigelas	2 00
Jacob W. Manning, German Irises	2 00

Bussey Institution, Spanish Irises	$1 00
Joseph H. Woodford, Seedling Clematises	2 00
Dr. C. G. Weld, Gloxinias and Clematises	2 00
Jackson Dawson, Hardy Flowering Shrubs	15 00
Hon. Joseph S. Fay, Hardy Flowering Trees and Shrubs	4 00
Mrs. E. M. Gill, Pyrethrums and Cut Flowers	2 00
Botanic Garden of Harvard University, Herbaceous Plants	6 00
Rea Brothers, " "	2 00
Leverett M. Chase " "	1 00
E. W. Gilmore, Tuberous Begonias	1 00
H. K. Southworth, Thirteen varieties of Carnations	2 00

JUNE 18.

Gratuities: —

Francis Brown Hayes, Rhododendrons	8 00
" " " Roses	2 00
Benjamin D. Hill, Pæonies and Clematis	2 00
Miss Ellen M. Harris, White Pæony, var. Festiva	1 00
Mrs. E. M. Gill, Cut Flowers	1 00

ROSE EXHIBITION.

JUNE 22 AND 23.

Special Prize, Theodore Lyman Fund.

HARDY PERPETUAL ROSES.— Twenty-four distinct named varieties, three of each variety, Hon. Joseph S. Fay	35 00
Second, John L. Gardner	30 00
Third, William H. Spooner	25 00

Special Prizes, offered by the Society.

Six blooms of Baroness Rothschild, the second prize to Mrs. E. M. Gill	4 00
Six blooms of John Hopper, the second prize to Nathaniel T. Kidder	4 00
Six blooms of Marquise de Castellane, the second prize to Dr. C. G. Weld	4 00
Six blooms of Merveille de Lyon, the second prize to George H. Lomax	4 00
Six blooms of Mme. Gabrielle Luizet, Dr. C. G. Weld	5 00
Second, Nathaniel T. Kidder	4 00
Six blooms of Mme. Victor Verdier, the second prize to Dr. C. G. Weld	4 00
Twelve blooms of any other variety, the second prize to Mrs. E. M. Gill	5 00

Regular Prizes.

Sixteen distinct named varieties, three of each variety, Hon. Joseph S. Fay	$20 00
Twelve distinct named varieties, three of each variety, Hon. Joseph S. Fay	15 00
Second, Dr. C. G. Weld	10 00
Six distinct named varieties, three of each variety, Hon. Joseph S. Fay	15 00
Second, Dr. C. G. Weld	10 00
Third, William H. Spooner	8 00
Three distinct named varieties, three of each variety, the second prize to Hon. Joseph S. Fay	8 00
Third prize to William H. Spooner	5 00
Twenty-four distinct named varieties, one of each variety, Hon. Joseph S. Fay	15 00
Third prize to William H. Spooner	8 00
Eighteen distinct named varieties, one of each variety, the second prize to Alexander Galbraith	8 00
Twelve distinct named varieties, one of each variety, the second prize to Nathaniel T. Kidder	6 00
Third, Dr. C. G. Weld	4 00
Six distinct named varieties. one of each variety, the second prize to Nathaniel T. Kidder	4 00
Third, Dr. C. G. Weld	3 00
Three distinct named varieties, one of each variety, Hon. Joseph S. Fay	3 00
Second, Dr. C. G. Weld	2 00
Third, Alexander Galbraith	1 00
Twelve blooms of not less than four varieties, introduced since 1889, Hon. Joseph S. Fay	10 00
Moss Roses.— Six distinct named varieties, three clusters of each, Hon. Joseph S. Fay	6 00
Third prize to John L. Gardner	3 00
General Display.— One hundred bottles of Hardy Roses, Hon. Joseph S. Fay	10 00
Third, Mrs. E. M. Gill	8 00
Fourth, John L. Gardner	7 00
Fifth, H. A. Stevens	6 00
Herbaceous Pæonies.— Twelve named varieties, the second prize to Thomas C. Thurlow	8 00
Sweet Williams.— Thirty spikes, not less than six distinct varieties, E. Sheppard & Son	4 00
Second, Joseph H. White	3 00
Third, Frederick S. Davis	2 00
Vase of Flowers.— Best arranged, in one of the Society's glass vases, Mrs. E. M. Gill	5 00
Second, Mrs. A. D. Wood	4 00

Gratuities : —

John L. Gardner, Hybrid Roses	$20 00
Hon. Joseph S. Fay, "	10 00
William H. Spooner, "	10 00
Dr. C. G. Weld, "	10 00
Francis Brown Hayes, "	4 00
Charles W. Parker, "	2 00
Thomas C. Thurlow, Pæonies	3 00
John C. Hovey, "	2 00
Benjamin D. Hill, "	2 00
Sarah R. Robbins, Collection of Sweet Williams	2 00
E. Sheppard & Son, Sweet Williams, Campanulas, etc.	2 00
Frederick S. Davis, Campanulas and Poppies	1 00
Alexander Galbraith, Foxgloves	4 00
Botanic Garden of Harvard University, Collection of Herbaceous Plants	6 00
Rea Brothers, Herbaceous Plants	3 00
Francis Brown Hayes, Rhododendrons and Pæonies	5 00
Jackson Dawson, *Andromeda speciosa* and Syringas	5 00
Bussey Institution, English Irises	1 00
Mrs. E. M. Gill, Cut Flowers	2 00
Sarah M. Vose, Basket of Flowers	1 00
Mrs. P. D. Richards, Wild Flowers	2 00
E. H. Hitchings, " "	2 00

JUNE 25.

Gratuity : —

Mrs. P. D. Richards, Wild Flowers	1 00

JULY 2.

DELPHINIUMS. — Collection of twenty spikes, John L. Gardner	5 00
Second, Nathaniel T. Kidder	4 00
Third, Dr. C. G. Weld	3 00
LILIUM CANDIDUM. — Twelve spikes, Leverett M. Chase	4 00
Second, Bussey Institution	3 00
Third, S. Coolidge	2 00
FOXGLOVES. — Twelve spikes, Frederick S. Davis	2 00
HERBACEOUS PLANTS. — Forty bottles, Nathaniel T. Kidder	8 00
Second, Shady Hill Nursery Co.	6 00
Third, Jacob W. Manning	4 00
BASKET OF FLOWERS. — Mrs. A. D. Wood	5 00
Second, Mrs. E. M. Gill	4 00

Gratuities : —

E. Sheppard & Son, Campanulas, Larkspurs, etc.	2 00
Benjamin D. Hill, Lilies, etc.	1 00
Rea Brothers, Collection of Herbaceous Plants	3 00

Hon. Joseph S. Fay, Hybrid Roses	$10 00
Charles W. Parker, Collection of Roses	1 00
Rose Buxton, Sweet Peas	1 00
George McWilliam, Dipladenias	1 00
Mrs. E. M. Gill, Cut Flowers	1 00
Mrs. P. D. Richards, Wild Flowers	3 00

JULY 9.

IRIS KÆMPFERI.— Fifteen varieties, three of each, in vases, John L. Gardner	8 00
Third prize, Shady Hill Nursery Co.	5 00
Six named varieties, three of each, in vases, E. Sheppard & Son	4 00
Second, Shady Hill Nursery Co.	3 00
VASE OF FLOWERS.— Best arranged, in one of the Society's glass vases, Mrs. E. M. Gill	4 00
Second, Mrs. A. D. Wood	3 00
Third, Miss Sarah W. Story	2 00
NATIVE PLANTS.— Collection, not exceeding forty bottles, Mrs. P. D. Richards	5 00
Second, Walter E. Coburn	4 00

Gratuities: —

E. Sheppard & Son, Iris Kæmpferi	1 00
John L. Gardner, Delphiniums	2 00
John L. Gardner, Carnation, Grenadin	1 00
Mrs. E. S. Joyce, Hollyhocks	1 00
Rea Brothers, Herbaceous Plants	3 00

JULY 16.

HOLLYHOCKS.— Double, twelve blooms, of twelve distinct colors, in the Society's flat fruit dishes, Hon. Joseph S. Fay	5 00
Second, Nathaniel T. Kidder	4 00
Third, " "	3 00
Six blooms, of six distinct colors, in the Society's flat fruit dishes, Hon. Joseph S. Fay	3 00
Second, " "	2 00
Third, Nathaniel T. Kidder	1 00
Twelve spikes, double, Hon. Joseph S. Fay	5 00
PARLOR BOUQUET.— Mrs. A. D. Wood	4 00
Second, Mrs. E. M. Gill	3 00
Third, Miss Sarah W. Story	2 00

Gratuities: —

Hon. Joseph S. Fay, Hollyhocks	5 00
John L. Gardner, *Tecoma jasminoides*	1 00
Rose Buxton, Sweet Peas and Zinnias	2 00

Francis Brown Hayes, Rhododendrons, etc.	$2 00
Rea Brothers, Herbaceous Plants	1 00
Mrs. E. M. Gill, Cut Flowers	1 00
Mrs. P. D. Richards, Wild Flowers	2 00

JULY 23.

GLOXINIAS.— Display of cut flowers, Alexander Galbraith	4 00
Second, Nathaniel T. Kidder	3 00
NATIVE FERNS.— Best display, Mrs. P. D. Richards	5 00
Second, Walter E. Coburn	4 00

Gratuities: —

Mrs. E. M. Gill, Gloxinias	1 00
Hon. Joseph S. Fay, Collection of Hollyhocks	15 00
Miss Ellen M. Harris, Hollyhocks	1 00
Francis Brown Hayes, Display of Stocks	2 00
Nathaniel T. Kidder, Salpiglossis	2 00
Benjamin Grey, ten varieties of Nymphæas	2 00
Benjamin D. Hill, Seedling Clematis	1 00
Mrs. A. D. Wood, Cut Flowers	1 00

JULY 30.

SWEET PEAS.— Display, filling thirty vases, Joseph H. White	6 00
Second, William Patterson	4 00
Third, Charles W. Hallstram	3 00
HERBACEOUS PLANTS.— Forty bottles, Nathaniel T. Kidder	8 00
BASKET OF FLOWERS.— Mrs. E. M. Gill	4 00
Second, Mrs. A. D. Wood	3 00
Third, Miss Sarah W. Story	2 00

Gratuities: —

Rev. W. T. Hutchins and B. L. Bragg, Sweet Peas	2 00
A. Harrington, Sweet Peas	1 00
Benjamin Grey, Display of Nymphæas	3 00
Edwin S. Hill, Petunias and Dahlias	1 00
William C. Strong, Gladioli and Lilies	1 00
L. G. B. Robinson, Nasturtiums	1 00
Francis Brown Hayes, Cut Flowers	2 00
Mrs. P. D. Richards, Native Plants	2 00

AUGUST 6.

Special Prospective Prize, offered by the Society.

SWEET PEAS.— For the best display, other foliage than that of Sweet Peas admissible, the prize to be taken by the same person or firm twice in three consecutive years, William Patterson, a silver vase, value	25 00

Regular Prizes.

PERENNIAL PHLOXES.— Ten distinct named varieties, Shady Hill Nursery Co.	$5 00
Second, Francis Brown Hayes	4 00
VASE OF FLOWERS.— Mrs. E. M. Gill	4 00
Second, Mrs. A. D. Wood	3 00
NATIVE FLOWERS.— Collection, not exceeding forty bottles, Mrs. P. D. Richards	5 00
Second, Walter E. Coburn	4 00

Gratuities:—

Charles W. Hallstram, Sweet Peas	3 00
Benjamin Grey, Nymphæas	2 00
Daniel D. Lee, "	1 00
William C. Strong, Lilies and Gladioli	5 00
H. A. Stevens, Zinnias	1 00
Francis Brown Hayes, Cut Flowers	3 00
E. H. Hitchings, Wild Flowers	1 00

AUGUST 13.

GLADIOLI.— Ten named varieties, in spikes, Alexander Galbraith	3 00
Second, J. Warren Clark	2 00
Six named varieties, in spikes, Alexander Galbraith	2 00
Second, J. Warren Clark	1 00
Display of named and unnamed varieties, filling one hundred vases, J. Warren Clark	8 00
Second, Richard T. Lombard	6 00

Gratuities:—

Dr. C. G. Weld, Collection of Gladioli	3 00
J. Warren Clark, " "	3 00
Alexander Galbraith, " "	2 00
William C. Strong, Lilies, Gladioli, etc.	5 00
John L. Gardner, Gloxinias, etc.	2 00
Benjamin D. Hill, Clematis	1 00
Walter E. Coburn, Petunias	2 00
Edwin S. Hill, "	1 00
Rose Buxton, Zinnias and Lilies	1 00
Francis Brown Hayes, Cut Flowers	5 00
Mrs. P. D. Richards, Wild Flowers	2 00

AUGUST 20.

Gratuities:—

Fisher Brothers & Co., Collection of Cannas	3 00
J. Warren Clark, Gladioli	4 00
Benjamin D. Hill, Seedling Clematis	1 00

Walter E. Coburn, Petunias	$1 00
Edwin S. Hill, "	1 00
Daniel D. Lee, Nymphæas and Wild Rice	1 00
Seth Rich, Tuberous Begonias and *Amaryllis Hallii*	1 00
Francis Brown Hayes, Cut Flowers	3 00
Mrs. A. D. Wood, " "	1 00
Mrs. E. M. Gill, " "	1 00
Mrs. P. D. Richards, Wild Flowers	2 00
E. H. Hitchings, " "	2 00

AUGUST 27.

ASTERS.— Large-flowered, of all classes, fifty vases, not less than twelve varieties, Mrs. Mary T. Goddard	5 00
Second, F. W. Vanderbilt, Newport, R. I.	4 00
Third, William Patterson	3 00
Truffaut's Pæony flowered, thirty blooms, not less than twelve varieties, Mrs. Mary T. Goddard	5 00
Second, Joseph H. White	4 00
Victoria Flowered, thirty blooms, not less than twelve varieties, William Patterson	5 00
Second, Mrs. Mary T. Goddard	4 00

Gratuities:—

Francis Brown Hayes, Cut Plants of Asters	4 00
F. W. Vanderbilt, Asters	1 00
" " Three vases Lilies	3 00
Caleb W. Loring, Japan Lilies	2 00
Edwin S. Hill, Petunias	1 00
J. Warren Clark, Gladioli	4 00
Francis Brown Hayes, Cut Flowers	2 00
Mrs. E. M. Gill, " "	2 00
Benjamin D. Hill, " "	2 00
Mrs. A. D. Wood, " "	2 00
Mrs. P. D. Richards, Wild Flowers	2 00
E. H. Hitchings, " "	1 00

SEPTEMBER 3.

Gratuity:—

Seth Rich, Asters and Tuberous Begonias	2 00

ANNUAL EXHIBITION.

SEPTEMBER 6, 7, 8, AND 9.

Special Prize, Theodore Lyman Fund.

AQUATIC PLANTS.— Display, including not less than twelve flowers of Nymphæas and Nelumbiums, Dr. R. H. Faunce	30 00
Second, Benjamin Grey	20 00
Third, Daniel D. Lee	10 00

Regular Prizes.

Asters.— Collection of fifty varieties, one flower in each vase, the second prize to William Patterson	$4 00
Third, Mrs. Mary T. Goddard	3 00
Dahlias.— Specimen bloom, the second prize to William C. Winter	1 00
Liliputian, display, twenty-five bottles, not less than eight named varieties, the second prize to William C. Winter	2 00
Tropæolums.— Display, filling twenty-five vases, William Patterson	4 00
Second, Dr. C. G. Weld	3 00
Cannas.— Collection of not less than ten named varieties, in spikes, with foliage, Fisher Brothers & Co.	6 00
Third, William Patterson	4 00
Double Zinnias.— Twenty-five flowers, not less than six varieties, H. A. Stevens	4 00
Second, Francis Brown Hayes	3 00
Third, Frederick S. Davis	2 00
Herbaceous Plants.— Forty bottles, Shady Hill Nursery Co.	8 00
Second, Jacob W. Manning	6 00
Third, Nathaniel T. Kidder	4 00
Basket of Fowers.— Best arranged, Mrs. A. D. Wood	4 00
Second, Mrs. E. M. Gill	3 00
Native Plants.— Mrs. P. D. Richards	5 00
Second, E. H. Hitchings	4 00

Gratuities:—

Charles H. Yates, Collection of Asters	2 00
G. A. Smith, Asters and Gladioli	2 00
Edwin S. Hill, Pompon Dahlias and Petunias	1 00
R. & J. Farquhar & Co., Cannas and Gladioli	5 00
Sim & Duncan, Gloxinias and Tuberous Begonias	3 00
Francis Brown Hayes, Tuberous Begonias	1 00
Kenneth Finlayson, Double Zinnias	1 00
Botanic Garden, Collection of Herbaceous Plants	6 00
Charles V. Whitten, American Beauty Roses	3 00
William C. Strong, cut sprays of Ornamental Trees and Shrubs	5 00
Mrs. Julia A. Cain, Collection of Geraniums	1 00
Alexander Galbraith, Collection of *Phlox Drummondi* and Anemones	2 00
Francis Brown Hayes, Cut Flowers	3 00
Mrs. Mary T. Goddard, " "	2 00
Mrs. E. M. Gill, " "	2 00
Benjamin D. Hill, " "	1 00
Mrs. A. D. Wood, " "	1 00

September 17.

Perennial Asters.— Display of native or introduced species and varieties, George Hollis	5 00
Second, Mrs. P. D. Richards	4 00

Gratuities:—

Francis Brown Hayes, Tuberous Begonias	$2 00
Elisha S. Converse, " "	1 00
John H. Parker, Dahlias	1 00

SEPTEMBER 24.

Gratuities:—

R. & J. Farquhar & Co., Cannas	3 00
E. Sheppard & Son, Dahlias	1 00
C. E. Josselyn, "	1 00
William C. Strong, *Anemone Japonica*	1 00
Francis Brown Hayes, Tuberous Begonias	1 00
Mrs. E. M. Gill, Cut Flowers	1 00

OCTOBER 1.

Gratuity:—

Mrs. P. D. Richards, Asters	1 00

OCTOBER 4.

HERBACEOUS PLANTS.—Forty bottles, Nathaniel T. Kidder	8 00
Second, Shady Hill Nursery Co.	6 00

Gratuity:—

C. E. Josselyn, Dahlias	1 00

CHRYSANTHEMUM SHOW.

NOVEMBER 8, 9, 10, AND 11.

Special Prizes, from the Josiah Bradlee Fund.

CHRYSANTHEMUMS.—Six vases of six named varieties, ten blooms each, Galvin Brothers	20 00
Second, Charles V. Whitten	18 00

Special Prizes, offered by the Society.

Best Seedling, never disseminated, three blooms, Red, George B. Gill	5 00
Best Seedling, never disseminated, three blooms, Pink, J. Eaton, Jr.	5 00
Best Seedling, never disseminated, three blooms, White, John Simpkins	5 00
Best Seedling, never disseminated, three blooms, Yellow, Pitcher & Manda	5 00
Best Seedling, never disseminated, three blooms, any other color, J. Eaton, Jr.	5 00

Regular Prizes.

Twelve cut blooms, Incurved, named, in vases, Joseph H. White	$10 00
Twelve cut blooms, Japanese, named, in vases, E. A. Wood	10 00
Second, George B. Gill	6 00
Twelve cut blooms, Japanese Incurved, named, in vases, John Simpkins	10 00
Second, E. A. Wood	6 00
Six cut blooms, Incurved, named, in vases, E. A. Wood	6 00
Second, Joseph H. White	4 00
Six cut blooms, Japanese, named, in vases, John Simpkins	6 00
Second, E. A. Wood	4 00
Six cut blooms, Japanese Incurved, named, in vases, E. A. Wood	6 00
Third prize to George B. Gill	2 00
Six cut blooms, Reflexed, named, in vases, the second prize to E. A. Wood	4 00
Six cut blooms, Anemone, named, in vases, the third prize to Nathaniel T. Kidder	2 00
Best twelve varieties, named, introductions of the current year, E. A. Wood	8 00
Vase of blooms, on long stems, arranged in the Society's large China vases, John Simpkins	18 00
Second, Charles V. Whitten	16 00
Third, Mrs. A. D. Wood	14 00
Fourth, Mrs. E. M. Gill	12 00
Fifth, Francis Brown Hayes	10 00
Best vase of ten blooms, on long stems, Red, named, Waban Rose Conservatories	8 00
Second, George M. Anderson	6 00
Best vase of ten blooms, on long stems, Pink, named, Waban Rose Conservatories	8 00
Second, Charles V. Whitten	6 00
Best vase of ten blooms, on long stems, White, named, Waban Rose Conservatories	8 00
Second, John Simpkins	6 00
Third, Arthur H. Fewkes	4 00
Best vase of ten blooms, on long stems, Yellow, named, Waban Rose Conservatories	8 00
Second, Waban Rose Conservatories	6 00
Third, John Simpkins	4 00
Best vase of ten blooms, on long stems, any other color, named, Waban Rose Conservatories	8 00
Second, John Simpkins	6 00
Third, Charles V. Whitten	4 00

For Amateurs Only.

Twelve cut blooms, Incurved, named, Joseph H. White	10 00
Six cut blooms, Incurved, named, " "	6 00

Gratuities :—

Waban Rose Conservatories, Eight vases of Chrysanthemums	$8 00
Walter Hunnewell, Cut Chrysanthemums	5 00
Arthur H. Fewkes, " "	4 00
Francis Brown Hayes, Collection of Chrysanthemums	5 00
Charles V. Whitten, Vase of Chrysanthemums	5 00
Waban Rose Conservatories, Six vases of Roses	12 00
Richard T. Lombard, Twenty-five varieties of Carnations	3 00
Ellis Brothers, Two vases of Daybreak Carnations	2 00
Peter Fisher & Co., Three vases of Carnations	2 00
William C. Winter, Begonias	1 00
Miss Mary S. Walker, *Strelitzia regina*	2 00

APPLETON SILVER MEDAL.

Nathaniel T. Kidder, Best Collection of Herbaceous Plants, exhibited at stated times during the season, as specified in the Schedule.

APPLETON BRONZE MEDAL.

Shady Hill Nursery Co., Second Best Collection of Herbaceous Plants, exhibited at stated times during the season, as specified in the Schedule.

SOCIETY'S SILVER MEDALS.

Rhododendron Show, June 10–11. James Comley, Seedling Rhododendron, Mrs. Grover Cleveland.

September 24. James S. Cowles, Newport, R. I., Seedling Canna, Mrs. Fairman Rogers.

Chrysanthemum Show, November 8–11. John Burton, New Rose, American Belle.

FIRST CLASS CERTIFICATES OF MERIT.

January 9. Thomas Greaves, *Cypripedium insigne* var. *Greavesianum.*

March 12. Jackson Dawson, New Hybrid Rose, *rugosa*, Gen. Jacqueminot.

Spring Exhibition, March 22–25. Siebrecht & Wadley, New Rochelle, N. Y., Seedling Nepenthes.

Rhododendron Show, June 10, 11. Thomas C. Thurlow, *Fagus purpureus tricolor.*

Rose Show, June 22, 23. Jackson Dawson, Seedling Philadelphus.

July 23. Benjamin Grey, *Nymphæa odorata sulphurea.*

August 13. William E. Endicott, Seedling Gladiolus, Helior.

Annual Exhibition, September 6–9. Benjamin Grey, Hybrid *Nymphæa Greyæ.*

" " " " Dr. R. H. Faunce, *Nymphæa Laydekeri rosea.*

Chrysanthemum Show, November 8–11. Pitcher & Manda, Short Hills, N.J. Seedling Chrysanthemum, Mrs. F. L. Ames.

" " " " Arthur H. Fewkes, Seedling Chrysanthemum, Shawmut.

" " " " Nathan Smith & Son, Adrian, Mich., Seedling Chrysanthemum, M. A. Wheeler.

" " " " J. Eaton, Jr., Seedling Chrysanthemum, Clarence.

" " " " John Simpkins, Seedling Chrysanthemum, Snowflake.

" " " " C. D. Kingman, Seedling Chrysanthemum, Nemasket.

" " " " George Hollis, Seedling Chrysanthemum, Silver Cloud.

" " " " E. G. Hill, Seedling Chrysanthemum, Maud Dean.

" " " " J. Eaton, Jr., Seedling Chrysanthemum, Carrie Bell.

HONORABLE MENTION.

Spring Exhibition, March 22–25. Sewell Fisher, Seedling Carnation.

April 2. Joseph Tailby, Seedling Carnations.

May 21. Lewis H. Farlow, Fine variety of *Cattleya Mendelii*.

August 20. James F. C. Hyde, Seedling Phlox.

Annual Exhibition, September 6–9. Benjamin Grey, cream colored sport of *Nymphæa alba candidissima*.

" " " " Dr. R. H. Faunce, *Nymphæa odorata Carolinensis*.

October 4. Francis Brown Hayes, Tuberous Begonias.

Chrysanthemum Show, November 8–11. Sarah Fisher, Seedling Carnation.

" " " " Martin M. Cummings, Seedling White Carnation, Gov. Russell.

" " " " George B. Gill, Seedling Chrysanthemum, Ox-blood.

" " " " Norris F. Comley, Seedling Chrysanthemum, Mrs. Norris F. Comley.

" " " " E. G. Hill, Richmond, Ind., Seedling Chrysanthemum, Mrs. J. W. Crouch.

" " " " T. D. Hatfield, Seedling Chrysanthemums.

" " " " Nathan Smith & Son, Adrian, Mich., Seedling Chrysanthemums.

REPORT

OF THE

COMMITTEE ON FRUITS,

FOR THE YEAR 1892.

By E. W. WOOD, Chairman.

Seldom has the Committee been able to report a more favorable season for all the varieties of fruit than that of the past year. With the exception of the raspberry, the small fruits suffered little or no injury during the winter. One of the peculiarities of the season was that while the blackberry passed through the winter with comparatively little injury, the raspberry, in many places, was almost entirely destroyed.

The insect enemies have not been as numerous as in some past years, with the exception of the tent caterpillar, which has been the worst enemy with which the apple grower has had to contend. No matter how clean the orchardist may keep his trees, if his neighbors fail to do the same, or if the wild cherry trees are allowed to grow in the surrounding territory, he has to repeat his labor every year.

It would seem to be an eminently proper thing for this Society to petition the legislature, for a law compelling highway superintendents and owners of wild lands, to destroy the wild cherry trees, as they are the principal breeding ground for this insect pest; the growers of apples and plums are entitled to this protection.

The Newton Horticultural Society, the past year, offered sixty-one dollars in nine prizes, to the school children who should gather and bring to the committee, the largest number of belts — or nests — of eggs of the tent caterpillar. There was a lively

competition, and the lad who took the first prize brought in sixteen thousand, one hundred and sixty-three; the number which gained the smallest prize, was four thousand, one hundred and forty, and the whole number brought in by the children was one hundred and twenty-one thousand, six hundred and eight. In order that a larger number of children may share in the awards, the Society proposes next season to give one dollar to every child bringing in one thousand belts.

Evidence continues to accumulate with each succeeding season, as to the beneficial effects of spraying fruit trees and vines with insecticides. While in some locations, where orchards have received careful attention, good marketable fruit is grown without resort to the use of poisonous substances, in others the fruit has unquestionably been much improved by the use of Paris green or London purple, in destroying the codling moth, and the Bordeaux mixture in preventing mildew and rot among grapes, when applied according to directions sent out from the different experimental stations.

The exhibitions through the season have been well filled. At the Strawberry exhibition there was a lively competition, especially for the larger prizes. No exhibition during the year affords so favorable an opportunity for the amateur with limited grounds, as this, as the prizes are mostly for single baskets, and in only one instance are there more than two quarts of a kind required. It is desirable to get more exhibits from private gardens, as the market growers are confined to few varieties, while for home use a wider range in the selection of kinds is practised. Among the new varieties at the exhibition, was the Marshall, a seedling, grown by M. F. Ewell, of Marshfield Hills. It was of large size, good form, dark color, and good quality. Being a promising, new, and distinct variety, it received two first and three second prizes. Several of the older varieties, still desirable for their superior quality, especially for the amateur, were not shown.

The small fruits, with the exception of the raspberry, were shown at the weekly summer exhibitions in larger quanties than usual, and at the later weekly exhibitions plums, peaches, and the early apples and pears were well represented.

At the Annual Exhibition, the first week in October, the fruit, in quantity and quality, excelled any similar exhibitions in recent

years. Both apples and pears were shown in large quantity and splendid condition; late peaches and plums were finely represented, and we had the finest display of grapes made for many years.

Of the forty prizes offered for native grapes, thirty-seven were awarded, and Benjamin G. Smith and the Agricultural College made fine displays in collections, comprising most of the leading and new varieties. Of the eighty-nine prizes offered for pears, eighty-three were awarded. Of the eighty-seven prizes offered for apples, seventy-five were awarded; the prizes for the leading varieties were all taken, those not awarded being for new kinds not in general cultivation.

The November exhibition of Winter Apples and Pears was larger than usual, and the prizes for the varieties generally grown were all awarded.

One hundred dollars was added to the appropriation for fruit the past year, a part of which it was intended to use in securing a display of preserved and evaporated fruits at the Annual Exhibition, but as that show occurred at the same time as the Mechanics' Fair — where those upon whom we must mainly depend for an exhibit were interested — it was decided to postpone that feature of the exhibition to a future year.

The results of the year show an increase in the exhibits, an increase of exhibitors, and a decrease of inferior specimens which do not add to the interest of the exhibition or to the reputation of the grower. To the commercial fruit growers, the past season has been a satisfactory one. The small fruits all commanded good prices. Although the pear crop was not as large as the year previous, the fruit was of better quality, and brought considerably higher prices; while with apples, the growers in the New England states were especially favored, as the crop was much larger than in other portions of the country, and is selling readily at satisfactory prices.

The Committee have awarded in prizes and gratuities $1,633, leaving an unexpended balance of $167.

E. W. Wood,
Benj. G. Smith,
Chas. F. Curtis,
J. W. Hill,
Samuel Hartwell,
Warren Fenno,
} *Committee on Fruits.*

PRIZES AND GRATUITIES AWARDED FOR FRUITS.

JANUARY 2.

Gratuity:—

Edwin A. Hall, Collection of Pears $2 00

SPRING EXHIBITION.

March 22, 23, 24, AND 25.

WINTER APPLES.—Baldwin, George E. Sanderson 3 00
Second, Asa Clement 2 00
Third, Calvin Terry 1 00
Northern Spy, William T. Hall 3 00
Second, George B. Gill 2 00
Third, Calvin Terry 1 00
Roxbury Russet, George E. Sanderson 3 00
Second, Benjamin P. Ware 2 00
Third, Asa Clement 1 00
Tompkins King, Asa Clement 3 00
Any other variety. Benjamin P. Ware, Seaver Sweet . . . 3 00
Second, Asa Clement, Fallawater 2 00
Third, George E. Sanderson, Rhode Island Greening . . 1 00
WINTER PEARS.—Warren Fenno, Duchess of Bordeaux . . . 3 00
Second, Edwin A. Hall, Winter Nelis 2 00

JUNE 4.

Gratuity:—

Winter Brothers, Foreign Grapes 1 00

JUNE 9.

Gratuity:—

Benjamin P. Ware, Collection of Apples. 2 00

ROSE AND STRAWBERRY EXHIBITION.

JUNE 22 AND 23.

Special Prizes from the Theodore Lyman Fund.

STRAWBERRIES.—For the best four quarts of any variety, Samuel Barnard, Jewell, the Lyman Plate, value $20 00
Second, Marshall F. Ewell, Marshall, the Lyman plate, value 16 00
Varnum Frost, Bubach, the Lyman Plate, value . . . 12 00

Special Prizes Offered by the Society.

For the best two quarts of any variety, to be judged by points, Warren Heustis & Son, Belmont,	$6 00
Second, Marshall F. Ewell, Marshall	5 00
Third, Isaac E. Coburn, Jessie	4 00
Fourth, Varnum Frost, Middlefield	2 00

Regular Prizes.

For the largest and best collection, not less than twenty baskets, of two quarts each, and not less than five varieties, Varnum Frost	15 00
Second, George V. Fletcher	12 00
Third, Isaac E. Coburn,	10 00
Fourth, George F. Wheeler	8 00
Five baskets of one variety, two quarts each, Samuel Barnard, Jewell	8 00
Second, Marshall F. Ewell, Marshall	6 00
Third, Warren Heustis & Son, Belmont	5 00
Two quarts of Belmont, George V. Fletcher	4 00
Second, John L. Gardner	3 00
Third, Sumner Coolidge	2 00
Bidwell, Isaac E. Coburn	4 00
Second, H. R. Kinney	3 00
Bubach, Hon. Joseph S. Fay	4 00
Second, H. R. Kinney	3 00
Third, Samuel Barnard	2 00
Champion, George V. Fletcher	4 00
Second, Isaac E. Coburn	3 00
Third, George F. Wheeler	2 00
Charles Downing, Alexander Galbraith	4 00
Second, George F. Wheeler	3 00
Third, William Doran & Son	2 00
Crescent, Isaac E. Coburn	4 00
Second, George F. Wheeler	3 00
Cumberland, George F. Wheeler	4 00
Second, R. N. Wheeler	3 00
Jessie, Isaac E. Coburn	4 00
Second, George F. Wheeler	3 00
Third, Winter Brothers	2 00
Jewell, George V. Fletcher	4 00
Second, Samuel Barnard	3 00
Third, Varnum Frost	2 00
May King, Isaac E. Coburn	4 00
Second, H. R. Kinney	3 00
Third, R. N. Wheeler	2 00
Miner's Prolific, George F. Wheeler	4 00

Second, Isaac E. Coburn	$3 00
Third, F. J. Kinney	2 00
Any other variety, J. D. Gowing, Leader	4 00
Second, George F. Wheeler, Eureka	3 00
Third, Isaac E. Coburn, Middlefield	2 00
One quart of any new variety, not previously exhibited, Marshall F. Ewell, Marshall	3 00
Second, Winter Brothers, Mansfield	2 00
CHERRIES.—Two quarts of any variety, John C. Hovey, Black Tartarian	4 00
Second, Oliver R. Robbins, Black Tartarian	3 00
Third, William C. Eustis, Knight's Early Black	2 00
FOREIGN GRAPES.—Two bunches of any variety, Winter Brothers, Black Hamburg	6 00
Second, Winter Brothers, Muscat of Alexandria	4 00
FORCED PEACHES.—Six specimens of any variety, Winter Brothers, Waterloo	3 00
Second, Francis Brown Hayes, Hale's Early	2 00
Gratuity:—	
David L. Fiske, Sutton Beauty Apples	1 00

JULY 2.

STRAWBERRIES.—One quart of any variety, Marshall F. Ewell, Marshall	3 00
Second, Charles E. Grant, Gandy	2 00
CHERRIES.—Two quarts of Black Eagle, Charles F. Curtis	3 00
Black Tartarian, John C. Hovey	3 00
Second, Leverett M. Chase	2 00
Third, N. Watson	1 00
Coe's Transparent, John L. Bird	3 00
Downer's Late, Marshall W. Chadbourne	3 00
Any other variety, John C. Hovey	3 00
Second, Leverett M. Chase	2 00
Third, Marshall W. Chadbourne	1 00
Gratuities:—	
Charles E. Grant, Strawberries	1 00
Marshall F. Ewell, "	1 00

JULY 9.

CHERRIES.—Two quarts of any variety, Charles S. Smith, Hyde's Seedling	3 00
Second, John L. Bird, Coe's Transparent	2 00
Third, Marshall W. Chadbourne, Downer's Late	1 00
RASPBERRIES.—Two quarts of any variety, William Doran & Son Highland Hardy	3 00

CURRANTS.—Two quarts of any red variety, Alexander Galbraith, Fay's	$4 00
Second, Benjamin G. Smith, Fay's	3 00
Third, Benjamin G. Smith, Versaillaise	1 00
Two quarts of any white variety, Alexander Galbraith, White Grape	3 00
Second, F. J. Kinney, White Grape	2 00
Gratuities:—	
Francis Brown Hayes, Peaches	1 00
Winter Brothers, "	1 00

JULY 16.

RASPBERRIES.—Collection, not less than four varieties, two quarts of each, William Doran & Son	4 00
Two quarts of any variety, F. J. Kinney	3 00
Second, Alexander Galbraith	2 00
CURRANTS.—One quart of Versaillaise, Benjamin G. Smith	2 00
Second, William Doran & Son	1 00
One quart of any other red variety, Benjamin G. Smith, Fay's	2 00
Second, Alexander Galbraith, Fay's	1 00
One quart of any white variety, Benjamin G. Smith, Dana's Transparent	2 00
Second, F. J. Kinney, White Grape	1 00
GOOSEBERRIES.—Two quarts of any Native variety, Joseph S. Chase, Triumph	3 00
Second, Benjamin G. Smith, Downing	2 00
Third, Benjamin G. Smith, Smith's Improved	1 00
Gratuities:—	
Warren Fenno, Norfolk Cherries	1 00
W. G. Kendall, Blackberries and Mulberries	1 00
A. A. Johnson, Gooseberries	1 00
Robert Manning, *Elæagnus longipes*	1 00
Benjamin G. Smith, June Berries	1 00
Marshall W. Chadbourne, Collection	2 00

JULY 23.

RASPBERRIES.—Two quarts of any variety, F. J. Kinney, Cuthbert	3 00
Second, Charles E. Grant, Cuthbert	2 00
Third, Alexander Galbraith, "	1 00
CURRANTS.—One quart of any red variety, Alexander Galbraith, Fay's	3 00
Second, Benjamin G. Smith, Fay's	2 00
Third, Sidney Lawrence, "	1 00
One quart of any white variety, F. J. Kinney, White Grape	2 00
Second, Mrs. E. M. Gill, Dana's Transparent	1 00

BLACKBERRIES.—Two quarts of any variety, W. G. Kendall, Lucretia	$3 00
Second, Marshall W. Chadbourne, Dorchester	2 00
GOOSEBERRIES.—Two quarts of any Foreign variety, Benjamin G. Smith, Ashton	3 00
Second, Joseph S. Chase, Industry	2 00
Third, Benjamin G. Smith, Wellington's Glory	1 00
Gratuities:—	
Marshall W. Chadbourne, Cherries, Gooseberries, and Currants	1 00
W. B. Huntington, Blueberries	1 00
Mrs. E. M. Gill, Currants and Raspberries	1 00
Winter Brothers, Collection	2 00

JULY 30.

BLACKBERRIES.—Two quarts of any variety, Nathaniel T. Kidder	3 00
Second, Sarah M. Vose	2 00
Third, Marshall W. Chadbourne	1 00
PEARS.—Summer Doyenne, Leverett M. Chase	3 00
Second, Warren Fenno	2 00
Third, Charles N. Brackett	1 00
Any other variety, Charles N. Brackett, Giffard	3 00
PEACHES.—Any variety, Charles S. Smith, Alexander	3 00
Second, Winter Brothers, Waterloo	2 00
Gratuities:—	
Samuel Hartwell, Apples	1 00
Charles E. Grant, Raspberries	1 00
James L. Little, Prickly Pear	1 00
Winter Brothers, Collection	1 00

AUGUST 6.

APPLES.—Red Astrachan, Marshall W. Chadbourne	3 00
Second, Warren Heustis & Son	2 00
Third, Samuel Hartwell	1 00
Sweet Bough, George V. Fletcher	3 00
Second, Charles B. Travis	2 00
Third, Warren Heustis & Son	1 00
Tetofsky, Warren Fenno	3 00
Any other variety, Samuel Hartwell, Williams	3 00
Second, Samuel Hartwell, Oldenburg	2 00
Third, Winter Brothers, "	1 00
PEARS.—Giffard, Charles N. Brackett	3 00
Second, John L. Bird	2 00
Third, Mrs. Mary Langmaid	1 00
Any other variety, George Frost, Suprême de Quimper	3 00
Second, William H. Hunt, Clapp's Favorite	2 00
Third, Marshall W. Chadbourne, Clapp's Favorite	1 00

BLACKBERRIES.—Two quarts of any variety, Nathaniel T. Kidder . $3 00
Second, E. W. Wood 2 00
Third, Sarah M. Vose 1 00
PEACHES.—Any variety, Charles S. Smith 3 00
Second, Charles E. Grant 2 00
Third, Winter Brothers 1 00

Gratuity:—

Winter Brothers, Japan Plums 1 00

AUGUST 13.

APPLES.—Oldenburg, Samuel Hartwell 3 00
Second, George H. Hitchings 2 00
Third, William T. Hall 1 00
Any other variety, H. A. Stevens, Williams 3 00
Second, Warren Heustis & Son, Sweet Bough 2 00
Third, Samuel G. Damon, Red Astrachan 1 00
PEARS.—Clapp's Favorite, Samuel G. Damon 3 00
Second, Charles N. Brackett 2 00
Third, William C. Hunt 1 00
Manning's Elizabeth, Mrs. Mary Langmaid 2 00
Second, John J. Merrill 1 00
Any other variety, Charles N. Brackett, Brandywine . . . 2 00
Second, Mrs. Rose Buxton, Bloodgood 1 00
APRICOTS.—Charles E. Grant 3 00
Second, Warren Fenno 2 00
PEACHES.—Any variety, John D. Woodbury, Hales' Early . . 3 00
Second, Nathan D. Harrington, Seedling 2 00
Third, Winter Brothers, Waterloo 1 00
Six specimens of cold house or pot culture, Joseph H. White, Crawford's Early 3 00
Second, Winter Brothers, Clarassa 2 00
FOREIGN GRAPES.—Two bunches of any variety, George A. Nickerson, Black Hamburg 5 00
Second, Joseph H. White, Muscat Hamburg 4 00

AUGUST 20.

APPLES.—Chenango, Charles F. Curtis 3 00
Second, Samuel Hartwell 2 00
Williams, Charles F. Curtis 3 00
Second, Asa Clement 2 00
Third, Samuel Hartwell 1 00
Any other variety, Samuel Hartwell, Oldenburg 3 00
Second, Asa Clement, Gravenstein 2 00
Third, Charles E. Grant, " 1 00

Pears.—Bartlett, Marshall W. Chadbourne	$3 00
Second, Samuel Hartwell	2 00
Third, Charles E. Swain	1 00
Rostiezer, S. F. & F. L. Weston	3 00
Second, Charles N. Brackett	2 00
Third, Marshall W. Chadbourne	1 00
Tyson, J. M. Swett	3 00
Second, Aaron S. McIntosh	2 00
Third, John L. Bird	1 00
Any other variety, Charles N. Brackett, Clapp's Favorite	3 00
Second, William H. Hunt, " "	2 00
Third, E. H. Thompson, " "	1 00
Peaches.—Any variety, James F. M. Farquhar, Early Beatrice	3 00
Second, Nathan D. Harrington, Seedling	2 00
Plums.—Any variety, Rufus T. Tobey, Bradshaw	3 00
Second, Joseph S. Chase, Botan	2 00
Third, William Christie, Bradshaw	1 00

Gratuities:—

H. C. Thatcher, Foreign Grapes	3 00
Joseph H. White, Peaches and Nectarines	3 00

August 27.

Apples.—Foundling, Asa Clement	3 00
Second, Reuben Handley	2 00
Third, Benjamin G. Smith	1 00
Gravenstein, Reuben Handley,	3 00
Second, Samuel Hartwell	2 00
Third, George V. Fletcher	1 00
Maiden's Blush, W. G. Kendall	3 00
Second, Warren Fenno	2 00
Porter, Cephas H. Brackett	3 00
Second, Marshall W. Chadbourne	2 00
Third, Samuel G. Damon	1 00
Any other variety, Reuben Handley, Holden	3 00
Second, H. A. Stevens, Pumpkin Sweet	2 00
Third, Samuel Hartwell, Stump	1 00
Pears.—Andrews, Leverett M. Chase	3 00
Second, Benjamin G. Smith	2 00
Third, Samuel G. Damon	1 00
Boussock, Leverett M. Chase	3 00
Second, H. A. Stevens	2 00
Third, Charles N. Brackett	1 00
Any other variety, Samuel G. Damon, Clapp's Favorite	3 00
Second, Marshall W. Chadbourne " "	2 00
Third, Samuel G. Damon, Bartlett	1 00

PEACHES.—Collection, Charles S. Smith	$3 00
Second, Nathan D. Harrington,	2 00
Single Dish, Winter Brothers, Hale's Early	3 00
Second, Nathan D. Harrington, Coolidge's Favorite	2 00
Third, Charles S. Smith, Mountain Rose	1 00
PLUMS.—Bradshaw, Leverett M. Chase	2 00
Second, William Christie	1 00
Imperial Gage, George V. Fletcher	2 00
Second, Joseph S. Chase	1 00
Jefferson, Charles E. Grant	2 00
Lombard, Joseph S. Chase	2 00
Second, Calvin Terry	1 00
Washington, William Christie	2 00
Second, William H. Hunt	1 00
Any other variety, Joseph S. Chase, Botan	2 00
Second, William Christie, Pond's Seedling	1 00
NATIVE GRAPES.—Six bunches of any variety, Benjamin G. Smith, Champion,	3 00
Second, William H. Hunt, Rockwood	2 00
Third, Samuel Hartwell, Moore's Early	1 00
Gratuities:—	
George W. Jameson, Crab Apples	1 00
John L. Bird, Pears and Apples	1 00
Cephas H. Brackett, Grapes	1 00

SEPTEMBER 3.

Gratuities:—	
C. H. Johnson, Seedling Peaches	1 00
Charles E. Grant, Collection of Plums	1 00

SEPTEMBER 17.

APPLES.—Foundling, Asa Clement	3 00
Second, Reuben Handley	2 00
Garden Royal, Reuben Handley	3 00
Second, Benjamin G. Smith	2 00
Gravenstein, John L. Bird	3 00
Second, Samuel Hartwell	2 00
Third, Varnum Frost	1 00
Maiden's Blush, W. G. Kendall	3 00
Second, E. R. Cook	2 00
Third, C. C. Shaw	1 00
Porter, Samuel G. Damon	3 00
Second, William Patterson	2 00
Third, Marshall W. Chadbourne	1 00
Pumpkin Sweet, Benjamin G. Smith	3 00
Second, H. A. Stevens	2 00

Third, Samuel Hartwell	$1 00
Any other variety, Charles F. Holt	3 00
Second, E. R. Cook, Holden	2 00
Third, Asa Clement, Wealthy	1 00
PEARS.—Bartlett, W. Milmore	3 00
Second, Mrs. Mary Langmaid	2 00
Third, Varnum Frost	1 00
Belle Lucrative, Mrs. Mary Langmaid	3 00
Second, Leverett M. Chase	2 00
Third, Warren Fenno	1 00
Boussock, Leverett M. Chase	3 00
Second, Charles E. Swain	2 00
Third, Charles N. Brackett	1 00
Hardy, W. Milmore	3 00
Second, Charles F. Curtis	2 00
Third, Rufus T. Tobey	1 00
Paradise of Autumn, W. Milmore	3 00
Second, Leverett M. Chase	2 00
Third, Rufus T. Tobey	1 00
Souvenir du Congrès, W. G. Kendall	3 00
Second, Warren Fenno	2 00
Third, William Patterson	1 00
Any other variety, John J. Merrill, Sheldon	3 00
Second, Charles E. Swain, Seckel	2 00
Third, Charles E. Richardson, Louise Bonne of Jersey	1 00
PEACHES.—Coolidge's Favorite, Charles S. Smith	3 00
Crawford's Early, Nathan D. Harrington	3 00
Second, P. G. Hanson	2 00
Third, Mrs. Amos G. Patch	1 00
Foster, Samuel Hartwell	3 00
Second, Charles S. Smith	2 00
Third, John L. Bird	1 00
Oldmixon, Elisha S Converse	3 00
Second, Charles S. Smith	2 00
Third, Charles E. Grant	1 00
Stump the World, F. J. Kinney	3 00
Second, G. L. Brown	2 00
Third, Nathan D. Harrington	1 00
Any other variety, G. T. Raymond	3 00
Second, Nathan D. Harrington	2 00
Third, Charles S. Smith	1 00
PEACHES, ORCHARD HOUSE CULTURE.—Winter Brothers	4 00
Second, Charles E. Grant	3 00
NECTARINES.—C. C. Donnell	2 00
Second, Warren Fenno	1 00
PLUMS —Bradshaw, Leverett M. Chase	2 00
Imperial Gage, George V. Fletcher	2 00

Second, Charles E. Grant	$1 00
Jefferson, Samuel Hartwell	2 00
Lombard. John L. Bird	2 00
Second, George V. Fletcher	1 00
Any other variety, John L. Bird, Green Gage	2 00
Second, William Christie, Pond's Seedling	1 00
NATIVE GRAPES.—Six bunches of Cottage, William H. Hunt	3 00
Second, Samuel G. Damon	2 00
Third, J. M. W. Ober	1 00
Eumelan, Samuel G. Damon	3 00
Second, Benjamin G. Smith	2 00
Massasoit, Benjamin G. Smith	3 00
Second F. J. Kinney	2 00
Moore's Early, William H. Hunt	3 00
Second, Samuel Hartwell	2 00
Third, Samuel G. Damon	1 00
Any other variety, Willim H. Hunt, August Rose	3 00
Second, Warren Fenno, Delaware	2 00
Third, Samuel Hartwell, Worden	1 00
Grapes from girdled vines, any variety, F. J. Kinney, Worden	3 00
Second, F. J. Kinney, Concord	2 00

Gratuities:—

George W. Jameson, Grapes	2 00

SEPTEMBER 24.

Gratuity:—

George B. Andrews, Delaware Grapes	1 00

OCTOBER 1.

Gratuity:—

Calvin Terry, Apples and Cranberries	1 00

ANNUAL EXHIBITION OF FRUITS AND VEGETABLES.

OCTOBER 4, 5, AND 6.

SPECIAL PRIZES.

Samuel Appleton Fund.

BALDWIN APPLES.—Best twelve, Alexander Galbraith	5 00
HUBBARDSTON APPLES.—Best twelve, Mrs. Austin W. Ward	5 00
BOSC PEARS.—Best twelve, Elisha S. Converse	5 00
SHELDON PEARS.—Best twelve, William Patterson	5 00

Benjamin V. French Fund.

GRAVENSTEIN APPLES.—Best twelve, Samuel Hartwell	5 00
RHODE ISLAND GREENING APPLES.—Best twelve, Mrs. Austin W. Ward	5 00

Marshall P. Wilder Fund.

ANJOU PEARS.—Best twelve, Samuel G. Damon	$4 00
Second, Charles F. Curtis	3 00
Third, William S. Ewell & Son	2 00
Fourth, George W. Hall	1 00
BARTLETT PEARS.—Best twelve, George V. Fletcher	4 00
Second, Samuel G. Damon	3 00
Third, Varnum Frost	2 00
CONCORD GRAPES.—Best six bunches, George B. Andrews	3 00
Second, William H. Hunt	2 00
Third, F. J. Kinney	1 00
WORDEN GRAPES.—Best six bunches, George B. Andrews	3 00
Second, F. J. Kinney,	2 00
Third, Benjamin G. Smith	1 00

Special Prizes Offered by the Society.

ANJOU PEARS.—Best twelve, Mrs. Mary Langmaid	5 00
BARTLETT PEARS.—Best twelve, Varnum Frost	5 00
SECKEL PEARS.—Best twelve, W. G. Kendall	5 00
PEACHES.—Best twelve of any variety, W. D. Hinds	5 00
NATIVE GRAPES.—Best twelve bunches of any variety, Benjamin G. Smith, Eaton	5 00

REGULAR PRIZES.

Theodore Lyman Fund.

APPLES.—Baldwin, Mrs. Rose Buxton	4 00
Second, H. H. Morse	3 00
Third, Samuel Hartwell	2 00
Dutch Codlin, Warren Fenno	2 00
Second, Aaron S. McIntosh	1 00
Holden, C. M. Handley	3 00
Second, Samuel Hartwell	2 00
Third, O. B. Hadwen	1 00
Fameuse, Artemas Frost	3 00
Second, Benjamin G. Smith	2 00
Third, George V. Fletcher	1 00
Fletcher Russet, William H. Teele	3 00
Foundling, Asa Clement	4 00
Second, C. M. Handley	3 00
Gloria Mundi, Samuel Hartwell	3 00
Golden Russet, O. B. Hadwen	2 00
Gravenstein, Oliver B. Wyman	4 00
Second, Samuel Hartwell	3 00
Third, Asa Clement	2 00
Hubbardston, Marshall W. Chadbourne	4 00
Second, Alexander Galbraith	3 00

Third, Walter Russell	$2 00
Hunt Russet, A. M. Knowlton	3 00
Second, Samuel Hartwell	2 00
Third, Mrs. Rose Buxton	1 00
Lady's Sweet, A. M. Knowlton	2 00
Second, Asa Clement	1 00
Mackintosh, George C. Rice	3 00
Maiden's Blush, W. G. Kendall	2 00
Second, C. C. Shaw	1 00
Mother, Asa Clement	3 00
Second, H. R. Kinney	2 00
Third, Benjamin G. Smith	1 00
Northern Spy, William C. Eustis	3 00
Second, George V. Fletcher	2 00
Third, C. C. Shaw	1 00
Porter, C. F. Foster	3 00
Second, Samuel G. Damon	2 00
Third, Marshall W. Chadbourne	1 00
Pound Sweet, J. M. W. Ober	3 00
Second, Samuel Hartwell	2 00
Third, C. C. Shaw	1 00
Pumpkin Sweet, George W. Stevens	2 00
Rhode Island Greening, Mrs. Austin W. Ward	4 00
Second, Willard P. Plimpton	3 00
Third, Nathaniel T. Kidder	2 00
Roxbury Russet, George V. Fletcher	4 00
Second, E. R. Cook	3 00
Third, H. R. Kinney	2 00
Sutton, O. B. Hadwen	3 00
Tolman Sweet, Willard P. Plimpton	3 00
Second, Joshua T. Foster	2 00
Third, Artemas Frost	1 00
Tompkins King, William C. Eustis	3 00
Second, George H. Hitchings	2 00
Third, Samuel Hartwell,	1 00
Palmer Greening, O. B. Hadwen	3 00
Second, Charles N. Brackett	2 00
Third, Samuel Hartwell	1 00
Washington Strawberry, Alvin Thurston	2 00
Second, Miss Sarah W. Story	1 00
Wealthy, George C. Rice	3 00
Second, Asa Clement	2 00
Any other variety, William Everett, Jacob's Sweet	3 00
Second, William T. Hall, Drap d'or	2 00
Third, C. C. Shaw, Bellflower	1 00
Crab Apples.—Hyslop, C. C. Shaw	2 00
Second, Mrs. Austin W. Ward	1 00
Transcendent, Nathan D. Harrington	2 00

Society's Prizes.

PEARS.—Angouleme, Samuel G. Damon	$4 00
Second, Varnum Frost	3 00
Third, John McClure	2 00
Bosc, William Patterson	4 00
Second, John J. Merrill	3 00
Third, Lewis E. P. Smith	2 00
Fourth, Alexander Galbraith	1 00
Clairgeau, Samuel G. Damon	3 00
Second, William T. Hall	2 00
Third, Mrs. Mary Langmaid	1 00
Comice, Lewis E. P. Smith	3 00
Second, Warren Fenno	2 00
Third, Charles N. Brackett	1 00
Dana's Hovey, Thomas M. Davis	3 00
Second, Warren Fenno	2 00
Third, Charles E. Swain	1 00
Diel, Thomas M. Davis,	3 00
Second, Charles E. Swain	2 00
Third, Benjamin G. Smith	1 00
Fulton, Elisha S. Converse	3 00
Second, W. G. Kendall	2 00
Third, S. F. & F. L Weston	1 00
Goodale, the second prize to O. B. Hadwen	2 00
Howell, S. F. & F. L. Weston	3 00
Second, Benjamin G. Smith	2 00
Third, Warren Fenno	1 00
Josephine of Malines, Warren Fenno	3 00
Second, John L. Bird	2 00
Third, Benjamin G. Smith	1 00
Lawrence, William T. Hall	3 00
Second, Charles E. Swain	2 00
Third, Warren Fenno	1 00
Louise Bonne of Jersey, Thomas M. Davis	3 00
Second, Leverett M. Chase	2 00
Third, Aaron S. McIntosh	1 00
Marie Louise, Charles E. Swain	3 00
Second, Warren Fenno	2 00
Third, Edwin A. Hall	1 00
Merriam, Aaron S. McIntosh	3 00
Second, Charles E. Swain	2 00
Third, Charles F. Curtis	1 00
Onondaga, Leverett M. Chase	3 00
Second, Thomas M. Davis	2 00
Third, Horace Partridge	1 00
Seckel, B. B. Converse	4 00

Second, Mrs. Rose Buxton	$3 00
Third, W. Milman	2 00
Sheldon, Lewis E. P. Smith	4 00
Second, Mrs. Charles E. Wiggin	3 00
Third, Samuel G. Damon	2 00
Souvenir du Congrès, W. G. Kendall	3 00
Second, Benjamin G. Smith	2 00
Third, Marshall W. Chadbourne	1 00
St. Michael Archangel, Benjamin G. Smith	3 00
Second, Thomas M. Davis	2 00
Third, Warren Heustis & Son	1 00
Superfin, Samuel G. Damon	3 00
Second, Leverett M. Chase	2 00
Third, Rufus T. Tobey	1 00
Urbaniste, Elisha S. Converse	3 00
Second, John L. Bird	2 00
Third, A. D. Miller	1 00
Vicar, J. M. Swett	3 00
Second, Aaron S. McIntosh	2 00
Third, Charles E. Swain	1 00
Winter Nelis, Thomas M. Davis	3 00
Second, Edwin A. Hall	2 00
Third, Miss A. Lowell	1 00
Any other variety, Mrs. A. H. Lewis, Glout Morceau	3 00
Second, William S. Ewell & Son, Columbia	2 00
Third, Aaron S. McIntosh, Kingsessing	1 00
QUINCES.—Any variety, George S. Curtis	4 00
Second, Benjamin G. Smith	3 00
Third, George V. Fletcher	2 00
Fourth, Mrs. Mary T. Goddard	1 00
PEACHES.—Crawford's Late, W. D. Hinds	3 00
Any other variety, W. D. Hinds, Crosby	3 00
Second, G. L. Brown, Seedling	2 00
Third, Charles E. Grant, Stevens's Rareripe	1 00
PEACHES, ORCHARD HOUSE CULTURE.—Robert McLeod, Newport, R. I., Crawford's Late	4 00
Second, Robert McLeod, Crawford's Early	3 00
PLUMS.—Coe's Golden Drop, Mrs. Mary Langmaid	2 00
Second, W. D. Hinds	1 00
Any other variety, Charles E. Grant, Imperial Gage	2 00
NATIVE GRAPES.—Six bunches of Brighton, Benjamin G. Smith	3 00
Second, Joseph S. Chase	2 00
Third, Samuel G. Damon	1 00
Delaware, George B. Andrews	3 00
Second, Benjamin G. Smith	2 00
Third, Joseph S. Chase	1 00
Herbert, Joseph S. Chase	3 00

Iona, Samuel G. Damon	$3 00
Second, Henry W. Wilson	2 00
Lindley, Benjamin G. Smith	3 00
Second, F. J. Kinney	2 00
Third, Samuel G. Damon	1 00
Niagara, Samuel Hartwell	3 00
Second, George B. Andrews	2 00
Third, George W. Jameson	1 00
Pocklington, Samuel Hartwell	3 00
Second, George W. Jameson	2 00
Third, Samuel G. Damon	1 00
Prentiss, Joseph S. Chase	3 00
Second, Benjamin G. Smith	2 00
Third, Samuel G. Damon	1 00
Wilder, Benjamin G. Smith	3 00
Second, F. J. Kinney	2 00
Third, Samuel G. Damon	1 00
Worden, Samuel Hartwell	3 00
Second, F. J. Kinney	2 00
Third, Benjamin G. Smith	1 00
Any other variety, Benjamin G. Smith, Barry	3 00
Second, Samuel Hartwell, Esther	2 00
Third, William H. Hunt, August Rose	1 00
Six bunches of Concord, from girdled vines, F. J. Kinney	3 00
FOREIGN GRAPES.— Four varieties, two bunches each, George A. Nickerson	10 00
Second, Benjamin G. Smith	8 00
Black Hamburg, two bunches, George A. Nickerson	5 00
Buckland Sweetwater, " "	5 00
Muscat of Alexandria, " "	5 00
Second, Benjamin G. Smith	4 00
Any other variety, Mrs. J. Warren Clark	5 00
Second, George A. Nickerson	4 00
CRANBERRIES.— Half peck, Calvin Terry	3 00

Gratuities:—

V. C. Gilman, Collection of Apples	2 00
T. H. O'Neil, Endicott Pears, from the ancient tree in Danvers	2 00
Agricultural College, Collection of Grapes, Pears, and Peaches	20 00
Benjamin G. Smith, " "	7 00
George W. Jameson, " "	1 00
Robert Cameron, Decorating Hall	10 00
Jackson Dawson, Pine Apple	3 00
P. G. Hanson, Collection	3 00
George F. Pierce, *Carya sulcata* (Western Hickory) with fruit	1 00

EXHIBITION OF WINTER FRUITS AND VEGETABLES.

SATURDAY, NOVEMBER 19.

Special Prizes, Benjamin V. French Fund.

BALDWIN APPLES.—Best twelve, Arthur W. Blake	$5 00
HUBBARDSTON APPLES.— Best twelve, Marshall W. Chadbourne	5 00

Society's Prizes.

APPLES.— Baldwin, Dudley C. Littlefield, Greenland, N. H.	3 00
Second, H. H. Morse	2 00
Third, Joshua T. Foster	1 00
Danvers Sweet, Warren Fenno	3 00
Second, Benjamin G. Smith	2 00
Third, Asa Clement	1 00
Fletcher Russet, William H. Teele	3 00
Hubbardston, Marshall W. Chadbourne	3 00
Second, Samuel Hartwell	2 00
Third, Mary C. Perkins	1 00
Hunt Russet, William H. Hunt	3 00
Second, Asa Clement	2 00
Third, Samuel Hartwell	1 00
Lady's Sweet, Asa Clement	3 00
Second, A. M. Knowlton	2 00
Northern Spy, Mrs. W. W. Palmer	3 00
Second, William T. Hall	2 00
Third, Dudley C. Littlefield, Greenland, N. H.	1 00
Rhode Island Greening, Willard P. Plimpton	3 00
Second, George V. Fletcher	2 00
Third, Warren Fenno	1 00
Roxbury Russet, George V. Fletcher	3 00
Second, H. R. Kinney	2 00
Third, Asa Clement	1 00
Tolman Sweet, Willard P. Plimpton	3 00
Second, Joshua T. Foster	2 00
Third, Asa Clement	1 00
Tompkins King, William C. Eustis	3 00
Second, George V. Fletcher	2 00
Third, Asa Clement	1 00
Any other variety, John Parker	3 00
Second, Samuel Hartwell, Gloria Mundi	2 00
Third, E. A. Smith, Seedling	1 00
PEARS.— Angouleme, Samuel G. Damon	4 00
Second, Thomas M. Davis	3 00
Third, Mrs. J. L. Curtis	2 00
Fourth, Mary C. Perkins	1 00

Anjou, Mrs. J. L. Curtis	$4 00
Second, Andrew McDermott	3 00
Third, W. Milman	2 00
Fourth, George V. Fletcher	1 00
Clairgeau, William T. Hall	3 00
Second, Warren Fenno	2 00
Third, Benjamin P. Ware	1 00
Comice, Marshall W. Chadbourne	3 00
Second, Leverett M. Chase	2 00
Dana's Hovey, Willard P. Plimpton	4 00
Second, Charles E. Swain	3 00
Third, Thomas M. Davis	2 00
Fourth, Warren Fenno	1 00
Diel, Thomas M. Davis	3 00
Second, Mrs. M. S. Richardson	2 00
Third, Edwin A. Hall	1 00
Glout Morceau, A. P. Lewis	3 00
Second, Edwin A. Hall	2 00
Josephine of Malines, John L. Bird	3 00
Second, Warren Fenno	2 00
Third, Benjamin G. Smith	1 00
Langelier, Thomas M. Davis	3 00
Second, Aaron S. McIntosh	2 00
Third, John L. Bird	1 00
Lawrence, Leverett M. Chase	3 00
Second, William T. Hall	2 00
Third, A. A. Johnson	1 00
Vicar, J. M. Swett	3 00
Second, William H. McIntosh	2 00
Third, Aaron S. McIntosh	1 00
Winter Nelis, Andrew McDermott	3 00
Second, Edwin A. Hall	2 00
Third, Thomas M. Davis	1 00
Any other variety, S. F. & F. L. Weston, Columbia	3 00
Second, Edwin A. Hall, Easter Beurre	2 00
Third, Warren Fenno, Duchess of Bordeaux	1 00
Gratuity :—	
Charles Whittier, Persimmons	1 00

REPORT

OF THE

COMMITTEE ON VEGETABLES,

FOR THE YEAR 1892.

By CHARLES N. BRACKETT, CHAIRMAN.

The Committee on Vegetables respectfully submit the following brief report of their doings for the year now closing:

The past season has been prosperous and favorable for most branches of farming industry. The presence of heat and moisture, distributed with some degree of uniformity throughout the season of most active growth, furnishes the conditions favorable for a productive year to the horticulturist. In this respect the season just passed was more than usually propitious; no drought of any severity, or early frosts, having occurred to injure, or cut short, the period of vegetable growth.

Spring opened early. The month of April was unusually favorable for the preparation of the soil, and the sowing of seeds. The cool weather of the following month, however, was not favorable to rapid vegetable growth. Plants which required to be transplanted to the open ground received a check from which it took them a long time to recover. Later on, as the season advanced, vegetation put on a more cheerful aspect, and growth was rapid.

Since our last report your Committee have been steadily endeavoring to increase the interest in this department, and to make the exhibitions of the season a success; and it is hoped that some progress has been made in this direction.

Our work for the year has been harmoniously done, and in quantity and character we think the results have proved a gratifying improvement upon the past. A look backward gives us no reason to be dissatisfied with the progress made during the year.

The reliable working element of this department has been materially strengthened during the year, not only by the addition

of new exhibitors, but also by the return of several old ones, who, for some reason, had, for the past few years, dropped entirely out from our corps of contributors.

The large number of contributors, and the great variety of exhibits made during the year, have been very gratifying, as it shows an increased interest in the work of this department. These exhibits have, with very few exceptions, been well grown, showing ample evidence of care and skill in cultivation, and there has been a close competition for the various prizes offered from week to week.

Those whom in past seasons we had come to regard as regular and reliable contributors, have continued faithfully to perform their part towards making our shows as full and interesting as possible, and our exhibitions have been well attended.

The exhibition of forced vegetables on the first Saturday in January, and also on February 6, were very fine, and a decided improvement upon the preceding years. All the prizes offered at the show in January were competed for, and awarded. The same may be said of the exhibition of May 7.

February 20, F. S. Mackenzie of Woodstock, Vt., showed a very nice pair of Telegraph Cucumbers, which, for beauty, size, and uniformity of growth, we have rarely if ever seen excelled; they were worthy of special mention.

June 4, Walter Russell was awarded a First Class Certificate of Merit for White Box Radishes, a new white, turnip-shaped variety, of good size, and excellent quality, the flesh being very crisp and high flavored.

June 10, Peter Fisher showed a new forcing Tomato, called Conference, which attracted a good deal of attention and was much admired on account of the uniform size, color, and beauty of the fruit, which grows in clusters of five or six each, and was shown in that form, as cut from the vines. Mr. Fisher forces the tomato quite extensively for market, and informed the Committee that he considers this variety the most prolific and profitable for growing under glass, of any he had ever tested. It is said to have originated in England. Mr. Fisher also exhibited fine specimens of the Aird and Early Essex Tomatoes on the same date. The former is also of English origin. A First Class Certificate of Merit was awarded Mr. Fisher, for his New Forcing Tomato, Conference.

The crop of potatoes, although somewhat below the average in

yield in this vicinity the past season, has, nevertheless, been of excellent quality. Owing to favorable weather during the most critical period of growth, very little if any complaint has been heard of injury by blight or rot.

The first exhibition of potatoes during the season was on July 2. Hon. Joseph S. Fay took all three prizes offered on that date; and at the three succeeding exhibitions the prizes were all awarded to the same contributor, showing quite conclusively what the sands of Cape Cod can be made to produce, under proper cultivation. We were also largely indebted to Mr. Fay for fine displays of well grown vegetables of various kinds throughout the season, his collection of Melons, September 17, being particularly worthy of mention. The show of Potatoes at the Annual Exhibition was unusually fine. The first prize for the best four varieties was awarded to the Chairman of this Committee.

Peas and Beans have been shown in quantity, and great variety, all through their season. For Peas, the leading varieties have been, American Wonder, Advancer, Champion of England, Stratagem, Telephone, and Heroine.

The Tomato and Melon crops were from a week to ten days too late to meet the requirements of the Schedule. On prize day, August 6, no Melons and but few Tomatoes were shown. The first exhibition of Tomatoes of open culture, was on July 23, F. J. Kinney taking the first prize with Acme.

The Tomato crop, although a little later than usual, has been large and fine. The specimens shown September 17, and at the Annual Exhibition, have seldom been excelled. At the Annual Exhibition, October 4–6, there were upwards of sixty dishes on the tables, with a very close competition for prizes. Hon. Aaron Low was the largest contributor, and was awarded the first prize for the best three varieties. It is not often that so fine a display of Tomatoes can be made so late as this exhibition. A few new varieties have been shown during the season, but none calling for special mention.

At the Annual Exhibition the Special Prizes for Cauliflowers were awarded to A. M. Knowlton, and William H. Teele, in the order named. The first Special Prize for Celery, went to Artemas Frost, and the second to Isaac E. Coburn. The show of Celery at this exhibition, though not so large in quantity as last year, was nevertheless, remarkably fine and well grown. The old Boston Market variety, which we used to see in such perfection in the

days of the late Josiah Crosby and other Arlington growers of that time, has of late almost entirely given place to such varieties as Paris Golden and White Plume; neither of which, we think, can compare with the former, in point of quality or flavor.

November 19 was the last and closing exhibition of the year. The exhibition was a good one, most of the prizes being awarded. Hon. Aaron Low showed at this time three varieties of Tomatoes, of this season's out-door growth, in good condition, which is quite a remarkable record for so late in the season as the 19th of November.

The increase in the appropriation for Vegetables for the coming year has enabled the Committee to make some additions and alterations in the Schedule, to which the attention of contributors is called.

In looking back through the records of this Society to its beginning, and comparing the appropriations for prizes then made with those of the present year, some idea can be formed of what has been accomplished, and the progress made during the sixty-three years of its existence. The first Schedule of prizes offered by the Society, in 1829, was as follows:

For Fruit, $93.00; Flowers, $60.00; Vegetables, $35.00; a total of $188.00. In 1892 the appropriation for the same objects was $7,550.00; and this does not include the standing offers for Prospective Prizes, of more than $1,000.

When we reflect upon what our Society has in the past accomplished from so small a beginning, it leads the imagination to anticipate the degree of perfection in horticultural science at which our successors will arrive, at the close of another half century, should the same spirit of enterprise be manifested in the future as has been shown in the past.

During the past year there have been nineteen prize exhibitions, at which prizes have been awarded in accordance with the Schedule. Prizes and gratuities have been awarded to sixty-three different persons during the year.

Out of an appropriation of $1,000, there has been awarded, in prizes and gratuities, $989, leaving an unexpended balance of $11. Annexed is a list of awards made during the year.

For the Committee,

C. N. BRACKETT,

Chairman.

PRIZES AND GRATUITIES AWARDED FOR VEGETABLES.

JANUARY 2.

RADISHES.— Four bunches, S. P. Buxton	$3 00
Second, Charles A. Learned	2 00
CUCUMBERS.— Pair, Nathaniel T. Kidder	3 00
Second, John L. Gardner	2 00
LETTUCE.— Four heads, Varnum Frost	3 00
Second, John L. Gardner	2 00
PARSLEY.— Two quarts, John L. Gardner	3 00
Second, Nathaniel T. Kidder	2 00
Third, F. J. Kinney	1 00
TOMATOES.— Twelve specimens, Winter Brothers, Early Essex	3 00
Second, Winter Brothers, Lorillard	2 00
Third, William Stobbart	1 00

JANUARY 23.

Gratuity: —

David Allan, Mushrooms	1 00

FEBRUARY 6.

RADISHES.— Four bunches, Varnum Frost	3 00
CUCUMBERS.— Pair, Nathaniel T. Kidder	3 00
Second, John L. Gardner	2 00
DANDELIONS.— Peck, William C. Winter	3 00
LETTUCE.— Four heads, Tennisball, Varnum Frost	3 00
Third, John L. Gardner	1 00
MUSHROOMS.— Twenty-four specimens, David Allan	3 00
RHUBARB.— Twelve stalks, George Sanderson	3 00
TOMATOES.— Twelve specimens, Winter Brothers, Essex	3 00
Second, Winter Brothers, Lorillard	2 00
Third, William Stobbart	1 00

Gratuities: —

Calvin Terry, Onions	1 00
Warren Heustis & Son, Celery	1 00
George Sanderson, Parsley	1 00

FEBRUARY 20.

Gratuity: —

F. S. Mackenzie, Woodstock, Vt., Telegraph Cucumbers	1 00

MARCH 5.

Gratuities : —

Varnum Frost, Lettuce	$1 00
Francis Brown Hayes, Water Cress	1 00

SPRING EXHIBITION.

MARCH 22, 23, 24, AND 25.

RADISHES.— Four bunches Turnip Rooted, Warren Heustis & Son	3 00
CUCUMBERS.— Pair, John B. Moore & Son	3 00
CELERY.— Four roots, the second prize to Warren Heustis & Son	2 00
Third, Francis Blake	1 00
DANDELIONS.— Peck, Warren Heustis & Son	3 00
LETTUCE.— Four heads, the third prize to S. P. Buxton	1 00
WATER CRESS.— Two quarts, Francis Brown Hayes	2 00
PARSLEY.— Two quarts, George Sanderson	2 00
Second, William Nicholson	1 00
RHUBARB.— Twelve stalks, George Sanderson	3 00
Second, S. P. Buxton	2 00
TOMATOES.— Twelve specimens, William Nicholson, Nicholson's Hybrid	3 00
Second, Winter Brothers, Essex	2 00
Third, Winter Brothers, Lorillard	1 00

Gratuities : —

John L. Gardner, Cucumbers	2 00
Francis Blake, Tomatoes	1 00
Calvin Terry, Onions and Potatoes	1 00
Nathaniel T. Kidder, Collection	3 00

APRIL 2.

CUCUMBERS.— Pair of White Spine, S. P. Buxton	3 00
Any other variety, John L. Gardner, Telegraph	3 00
MUSHROOMS.— Twenty-four, William Patterson	3 00
Third prize to S. P. Buxton	1 00

Gratuity : —

Walter Russell, Collection of Radishes	2 00

APRIL 23.

Gratuity : —

Varnum Frost, Cucumbers	1 00

APRIL 30.

Gratuity : —

Francis Brown Hayes, Potatoes	1 00

MAY EXHIBITION.

May 7.

William J. Walker Fund.

Asparagus.— Four bunches, twelve stalks each, Varnum Frost	$3 00
Second, Edmund Hersey	2 00
Third, Leonard W. Weston	1 00
Cucumbers.— Pair, John L. Gardner	3 00
Second, Varnum Frost	2 00
Third, S. P. Buxton	1 00
Spinach.— Peck, Warren Heustis & Son	3 00
Second, Walter Russell	2 00
Third, Alexander Galbraith	1 00
Dandelions.— Peck, Warren Heustis & Son	2 00
Second, Walter Russell	1 00
Lettuce.— Four heads, Mrs. Mary T. Goddard	3 00
Second, Hon. Joseph S. Fay	2 00
Third, Walter Russell	1 00
Rhubarb.— Twelve stalks, Alexander Galbraith	3 00
Second, Cephas H. Brackett	2 00
Third, Miss Mary S. Walker	1 00

Gratuities : —

Winter Brothers, Tomatoes	1 00
Francis Brown Hayes, Potatoes	1 00
Walter Russell, Radishes	1 00
Francis Brown Hayes, Cress	1 00

May 14.

Gratuities :—

Hon. Joseph S. Fay, Asparagus and Lettuce	2 00
Walter Russell, Radishes and Lettuce	2 00

May 21.

Gratuity :—

Charles E. Grant, Asparagus	1 00

May 28.

Gratuity : —

Hon. Joseph S. Fay, Collection	2 00

June 4.

Gratuities : —

Cephas H. Brackett, Rhubarb	1 00
Marshall W. Chadbourne, Rhubarb	1 00
Charles E. Grant, Asparagus	1 00

Hon. Joseph S. Fay, Collection $2 00
S. P. Buxton, " 2 00
Winter Brothers, " 2 00
Walter Russell, White Box Radishes, First Class Certificate of Merit.

RHODODENDRON SHOW.

JUNE 10 AND 11.

BEETS.— Twelve specimens, William Christie 3 00
Third, Miss Mary S. Walker 1 00
CARROTS.— Twelve Short Scarlet, Warren Heustis & Son . . 3 00
Second, Warren Heustis & Son, Scarlet Forcing . . . 2 00
RADISHES.— Four bunches Turnip Rooted, Walter Russell, White Box 3 00
Second, Walter Russell, French Breakfast 2 00
Third, " " White Tip 1 00
Long Scarlet, Walter Russell 3 00
Second, Warren Heustis & Son 2 00
ASPARAGUS.— Four bunches, Charles E. Grant 3 00
Second, Leonard W. Weston 2 00
CUCUMBERS.— Pair, Warren Heustis & Son 3 00
LETTUCE.— Four heads, Hon. Joseph S. Fay, Deacon . . . 3 00
Second, Hon. Joseph S. Fay, Defiance 2 00
Third, Warren Heustis & Son 1 00
RHUBARB.— Twelve stalks, Cephas H. Brackett, Victoria . . 3 00
Second, Benjamin G. Smith, Monarch 2 00
Third, Alexander Galbraith, " 1 00

Gratuities: —

Peter Fisher, Aird and Essex Tomatoes 3 00
Hon. Joseph S. Fay, Cauliflowers 2 00
Nathaniel T. Kidder, Cucumbers and Tomatoes 2 00
Peter Fisher, New Tomato, Conference, First Class Certificate of Merit.

JUNE 18.

Gratuities: —

Cephas H. Brackett, Peas 1 00
Charles E. Grant, " 1 00

ROSE AND STRAWBERRY EXHIBITION.

JUNE 22 AND 23.

BEETS.— Twelve Summer Turnip Rooted, Charles A. Learned, Egyptian 3 00
Second, Warren Heustis & Son 2 00
Third, Charles A. Learned, Eclipse 1 00

Onions.— Twelve specimens, Charles A. Learned, White Portugal	$3 00
Second, Warren Heustis & Son	2 00
Third, Charles A. Learned, Danvers	1 00
Cucumbers.— Pair of White Spine, Warren Heustis & Son	3 00
Second, Varnum Frost	2 00
Third, Charles A. Learned	1 00
Cabbages.— Three, Hon. Joseph S. Fay	3 00
Second, Walter Russell	2 00
Lettuce.— Four heads, Hon. Joseph S. Fay	3 00
Second, Charles A. Learned	2 00
Third, Walter Russell	1 00
Peas.— Half-peck, Hon. Joseph S. Fay, American Wonder	3 00
Second, P. G. Hanson, " "	2 00
Third, Samuel Hartwell, " "	1 00
Gratuities : —	
Walter Russell, Radishes	1 00
Winter Brothers, Tomatoes	1 00
Hon. Joseph S. Fay, Collection of Lettuce	2 00
Charles A. Learned, Collection	2 00

July 2.

Potatoes.— Twelve specimens, Hon. Joseph S. Fay, New Queen	3 00
Second, Hon. Joseph S. Fay, Early Rose	2 00
Third, " " " Hebron	1 00
Onions.— Twelve specimens, Charles A. Learned, Danvers	2 00
Second, Charles A. Learned, White Portugal	1 00
Cabbages.— Three, Charles A. Learned, Henderson	3 00
Second, Hon. Joseph S. Fay, Wakefield	2 00
Third, " " " Henderson	1 00
Peas.— Half-peck of American Wonder, Hon. Joseph S. Fay.	3 00
Second, Calvin Terry	2 00
Third, Mrs. Rose Buxton	1 00
Any other variety, Hon. Joseph S. Fay, Advancer	3 00
Second, John L. Gardner, Champion	2 00
Third, Charles E. Grant, Advancer	1 00
Gratuities : —	
Walter Russell, Cucumbers	1 00
Charles A. Learned, Collection	3 00
Hon. Joseph S. Fay, "	2 00
Nathaniel T. Kidder, "	1 00

July 9.

Potatoes.— Twelve specimens, Hon. Joseph S. Fay, Hebron	3 00
Second, Hon. Joseph S. Fay, Rose	2 00
Third, " " " New Queen	1 00

Beans.— Half-peck of String, Isaac E. Coburn	$3 00
Second, H. R. Kinney	2 00
Third, Hon. Joseph S. Fay	1 00
Peas.— Half-peck, Sidney Lawrence, Stratagem	3 00
Second, Charles N. Brackett, Telephone	2 00
Third, Charles E. Grant, Stratagem	1 00

July 16.

Cabbages.— Three of any variety, Hon. Joseph S. Fay, All Seasons	3 00
Second, Walter Russell, Drumhead	2 00
Beans.— Half-peck of Cranberry, Charles N. Brackett	3 00
Second, Isaac E. Coburn	2 00
Peas.— Half-peck, Charles N. Brackett, Telephone	3 00
Second, Charles E. Grant, Statagem	2 00
Third, Charles N. Brackett, Heroine	1 00

Gratuities: —

Hon. Joseph S. Fay, Collection	3 00
Walter Russell, "	2 00

July 23.

Potatoes.— Twelve specimens, Hon. Joseph S. Fay, Hebron	3 00
Second, Hon. Joseph S. Fay, Rose	2 00
Third, " " " Savoy	1 00
Sweet Corn.—Twelve ears, F. J. Kinney, Corey	3 00
Second, Charles E. Grant, Corey	2 00
Third, Oliver R. Robbins, "	1 00
Tomatoes.— Open culture, twelve specimens, F. J. Kinney, Acme	3 00
Second, E. W. Wood, Red Cross	2 00
Third, H. R. Kinney, Ruby	1 00

Gratuities: —

Calvin Terry, Peas	1 00
Charles E. Grant, Cranberry Beans	1 00
H. A. Stevens, Celery	1 00
Hon. Joseph S. Fay, Egg Plant and Cabbages	1 00
Charles N. Brackett, Collection	2 00

July 30.

Potatoes.— Twelve specimens, Hon. Joseph S. Fay, Rose	3 00
Second, Hon. Joseph S. Fay, Savoy	2 00
Peas.— Half peck, Sidney Lawrence, Stratagem	3 00
Second, Charles N. Brackett, Heroine	2 00
Sweet Corn.— Twelve ears, F. J. Kinney, Farquhar	3 00
Second, Samuel Hartwell, Crosby	2 00
Third, Charles E. Grant, Corey	1 00

Tomatoes.— Twelve specimens, F. J. Kinney, Acme	$3 00
Second, Isaac E. Coburn, Atlantic	2 00
Third, H. A. Kinney, Ruby	1 00
Gratuities: —	
Jackson Dawson, Prescott Wonder Cucumbers	1 00
Warren Heustis & Son, Collection	2 00

August 6.

Tomatoes.— Twelve specimens of Acme, Charles N. Brackett	3 00
Twelve specimens of Emery, Charles N. Brackett	3 00
Any other variety, Charles N. Brackett, Advance	3 00
Second, Isaac E. Coburn, Atlantic	2 00
Third, Charles E. Grant, Puritan	1 00
Gratuities: —	
Sidney Lawrence, Stratagem Peas	1 00
Warren Heustis & Son, Collection	3 00
Samuel Hartwell, "	1 00
Charles N. Brackett, "	1 00
Charles E. Grant, "	1 00

August 13.

Greenflesh Melons.— Four specimens, Varnum Frost	3 00
Second, Isaac E. Coburn	2 00
Third, Samuel Hartwell	1 00
Sweet Corn.— Twelve ears, Charles E. Grant, Potter's Excelsior	3 00
Second, Charles N. Brackett, Potter's Excelsior	2 00
Third, " " Bourn's Favorite	1 00
Gratuities: —	
H. A. Stevens, Celery	1 00
Charles E. Grant, Beans	1 00
Charles N. Brackett, Collection	3 00
Warren Heustis & Son, "	2 00

August 20.

Potatoes.— Twelve specimens, Hon. Joseph S. Fay, Hebron	3 00
Second, P. G. Hanson, Hebron	2 00
Third, Hon. Joseph S. Fay, Rose	1 00
Onions.— Twelve specimens, Hon. Joseph S. Fay, Danvers	3 00
Second, Hon. Joseph S. Fay, Wethersfield	2 00
Third, H. A. Stevens, Danvers	1 00
Greenflesh Melons.— Four specimens, Isaac E. Coburn	3 00
Second, Varnum Frost	2 00
Third, Warren Heustis & Son	1 00

Watermelons.— Pair, the second prize to Charles E. Grant, Black Spanish	$2 00
Third, Charles E. Grant, Kolb's Gem	1 00
Beans.— Two quarts of Large Lima, Varnum Frost	3 00
Second, Charles E. Grant	2 00
Third, H. A. Stevens	1 00
Two quarts of Dwarf Lima, Charles E. Grant	3 00
Second, William Christie	2 00
Two quarts of Goddard, shelled, William Christie	3 00
Second, Calvin Terry	2 00
Sweet Corn.— Twelve ears of Potter's Excelsior, P. G. Hanson	3 00
Second, Charles N. Brackett	2 00
Third, Hon. Joseph S. Fay	1 00
Twelve ears of any other variety, Charles N. Brackett, Bourn's Favorite	3 00
Second, P. G. Hanson, Stowell's	2 00
Third, Charles E. Grant, Burr's	1 00
Peppers.— Twelve specimens of Squash, Charles N. Brackett	3 00
Second, Hon. Joseph S. Fay	2 00
Twelve specimens of any other variety, Charles N. Brackett, Ruby King	3 00
Second, Hon. Joseph S. Fay, Bull Nose	2 00
Third, Hon. Joseph S. Fay, Ruby King	1 00

Gratuities : —

Charles N. Brackett, Collection of Tomatoes	3 00
Isaac E. Coburn, " "	2 00
Charles E. Grant, Tomatoes	1 00
Varnum Frost, "	1 00
P. G. Hanson, "	1 00
Warren Heustis & Son, Celery	1 00
W. G. Kendall, Kohl Rabi	1 00
Hon. Joseph S. Fay, Egg Plant	2 00

August 27.

Cabbages.— Three, Charles B. Lancaster	3 00
Second, William Christie	2 00
Cauliflowers.— Four specimens, A. M. Knowlton	3 00
Celery.— Four roots, Warren Heustis & Son	3 00
Second, H. A. Stevens	2 00
Beans.— Two quarts of Large Lima, H. A. Stevens	3 00
Martynias.— Twelve specimens, Walter Russell	2 00
Peppers — Twelve specimens of Squash, Charles N. Brackett	3 00
Second, George W. Jameson	2 00
Any other variety, Charles N. Brackett, Ruby King	3 00
Second, Charles N. Brackett, Queen	2 00

Gratuities: —

Charles N. Brackett,	Collection	$4 00
P. G. Hanson,	"	3 00
Charles E. Grant,	"	2 00
Mrs. E. M. Gill,	"	1 00
Warren Heustis & Son	"	1 00

SEPTEMBER 3.

Gratuity: —

Charles E. Grant, Lima Beans	1 00

SEPTEMBER 17.

GREENFLESH MELONS.— Four specimens, Hon. Joseph S. Fay	3 00
Second, Samuel Hartwell	2 00
Third, Charles E. Grant	1 00
WATERMELONS.— Two specimens, Hon. Aaron Low, Peerless	3 00
Second, Charles E. Grant, Kolb's Gem	2 00
Third, Charles E. Grant, Peerless	1 00
BEANS.— Large Lima, two quarts, Varnum Frost	3 00
Second, Charles E. Grant	2 00
Third, Mrs. E. M. Gill	1 00
SWEET CORN.— Twelve ears of Potter's Excelsior, Isaac E. Coburn	3 00
Second, Charles N. Brackett	2 00
Any other variety, P. G. Hanson, Stowell's	3 00
Second, Samuel Hartwell "	2 00
Third, Charles E. Grant "	1 00
EGG PLANT.— Four Round Purple, Edward J. Coolidge	3 00
Second, H. R. Kinney	2 00
Third, Hon. Joseph S. Fay	1 00
TOMATOES.— Three varieties, twelve specimens each, Charles N. Brackett	5 00
Second, Varnum Frost	4 00
Third, Hon. Aaron Low	3 00
Acme, twelve specimens, Hon. Aaron Low	3 00
Second, Charles N. Brackett	2 00
Third, Varnum Frost	1 00
Cardinal, Hon. Aaron Low	3 00
Second, Varnum Frost	2 00
Third, Charles E. Grant	1 00
Emery, Varnum Frost	3 00
Second, Warren Heustis & Son	2 00
Third, Hon. Aaron Low	1 00
Paragon, Charles N. Brackett	3 00
Second, Varnum Frost	2 00
Any other variety, Hon. Aaron Low, Peerless	3 00
Second, Charles N. Brackett, Perfection	2 00
Third, " " Beauty	1 00

PEPPERS.— Twelve Squash, George W. Jameson	$3 00
Second, Charles N. Brackett	2 00
Third, William Christie	1 00
Any other variety, Charles N. Brackett, Ruby King	3 00
Second, Hon. Joseph S. Fay, Ruby King	2 00
Third, " " " Bull Nose	1 00

Gratuities : —

Charles E. Grant, Watermelons	2 00
Hon. Joseph S. Fay, Collection of Melons	5 00
Charles E. Grant, Beans	1 00
Charles N. Brackett, Lima Beans and Tomatoes, three varieties	2 00
Hon. Aaron Low, Collection of Tomatoes	4 00
William H. Teele, Cauliflowers	3 00
Varnum Frost, Celery	2 00
E. J. Coolidge, "	1 00
P. G. Hanson, Collection	1 00
Mrs. E. M. Gill, "	1 00

OCTOBER 1.

Gratuity : —

Calvin Terry, Collection	1 00

ANNUAL EXHIBITION.

OCTOBER 4, 5, AND 6.

Special Prizes.

CAULIFLOWERS.— Four, A. M. Knowlton	5 00
Second, William H. Teele	4 00
CELERY.— Four specimens, Artemas Frost	8 00
Second, Isaac E. Coburn	6 00

Regular Prizes.

BEETS.— Twelve Turnip Rooted, Varnum Frost	3 00
Second, George F. Stone	2 00
Third, Warren Heustis & Son	1 00
CARROTS.— Twelve Long Orange, H. R. Kinney	3 00
Second, F. J. Kinney	2 00
Twelve Intermediate, F. J. Kinney	3 00
Second, H. R. Kinney	2 00
Third, Walter Russell	1 00
PARSNIPS.— Twelve long, Varnum Frost	3 00
Second, F. J. Kinney	2 00
Third, Charles A. Learned	1 00

POTATOES.— Four varieties, twelve specimens each, Charles N. Brackett	$5 00
Second, Mrs. Mary T. Goddard	4 00
Third, " " "	3 00
Clark, twelve specimens, Mrs. Mary T. Goddard	3 00
Second, H. R. Kinney	2 00
Third, F. J. Kinney	1 00
Hebron, P. G. Hanson	3 00
Second, Mrs. Mary T. Goddard	2 00
Third, F. J. Kinney	1 00
Rose, Mrs. Mary T. Goddard	3 00
Second, H. R. Kinney	2 00
Third, Charles S. Smith	1 00
Savoy, F. J. Kinney	3 00
Second, H. R. Kinney	2 00
Third, A. M. Knowlton	1 00
Any other variety, Charles N. Brackett, Lee's Favorite	3 00
Second, H. R. Kinney, Essex	2 00
Third, Charles N. Brackett, Northern Beauty	1 00
SALSIFY.— Twelve specimens, Charles A. Learned	3 00
Second, Walter Russell	2 00
Third, Warren Heustis & Son	1 00
TURNIPS.— Twelve specimens Flat, F. J. Kinney	2 00
Second, George F. Stone	1 00
Swedish, Twelve, F. J. Kinney	2 00
Second, F. J. Kinney	1 00
ONIONS.— Twelve Danvers, Walter Russell	3 00
Second, E. Tasionari	2 00
Third, H. R. Kinney	1 00
Red, Calvin Terry	3 00
Second, Hon. James J. H. Gregory	2 00
Third, H. R. Kinney	1 00
SQUASHES.— Three Hubbard, S. P. Buxton	3 00
Second, Samuel Hartwell	2 00
Third, John Parker	1 00
Hybrid Turban, S. P. Buxton	3 00
Second, P. G. Hanson	2 00
Third, Charles A. Learned	1 00
Marrow, Varnum Frost	3 00
Second, P. G. Hanson	2 00
Third, H. R. Kinney	1 00
Turban, John Parker	3 00
BRUSSELS SPROUTS.— Half-peck, John L. Gardner	3 00
Second, Mrs. Mary T. Goddard	2 00
CABBAGES.— Three Drumhead, Charles B. Lancaster	3 00
Second, Mrs. Mary T. Goddard	2 00
Third, S. P. Buxton	1 00

Red, Charles B. Lancaster	$3 00
Second, S. P. Buxton	2 00
Third, Mrs. Mary T. Goddard	1 00
Savoy, " " "	3 00
Second, Charles B. Lancaster	2 00
Third, S. P. Buxton	1 00
CAULIFLOWERS.— Four, William H. Teele	3 00
Second, A. M. Knowlton	2 00
CELERY.— Four roots Boston Market, the second prize to H. R. Kinney	4 00
Third, Warren Heustis & Son	3 00
Any other variety, Artemas Frost, Paris Golden	5 00
Second, Varnum Frost, Paris Golden	4 00
Third, Isaac E. Coburn " " "	3 00
ENDIVE.— Four specimens, H. R. Kinney	3 00
Second, Walter Russell	2 00
Third, H. R. Kinney, Green Curled	1 00
HORSERADISH.— Six roots, H. R. Kinney	3 00
Second, Charles A. Learned	2 00
Third, Walter Russell	1 00
CORN.— Field, twenty-five ears, Mrs. Mary T. Goddard	3 00
Second, Leonard W. Weston	2 00
EGG PLANT.— Four Round Purple, Edward J. Coolidge	3 00
Second, H. R. Kinney	2 00
Third, Nathaniel T. Kidder	1 00
TOMATOES.— Three varieties, twelve specimens each, Hon. Aaron Low	5 00
Second, Charles N. Brackett	4 00
Third, Varnum Frost	3 00
Acme, twelve specimens, Charles N. Brackett	3 00
Second, Hon. Aaron Low	2 00
Third, Varnum Frost	1 00
Cardinal, " "	3 00
Second, Charles N. Brackett	2 00
Third, Hon. Aaron Low	1 00
Emery, Varnum Frost	3 00
Second, Charles N. Brackett	2 00
Third, George Sanderson	1 00
Paragon, Charles N. Brackett	3 00
Second, Hon. Aaron Low	2 00
Third, Samuel Hartwell	1 00
Any other variety, Hon. James J. H. Gregory, Optimus	3 00
Second, Charles N. Brackett, Beauty	2 00
Third, Hon. Aaron Low, Peerless	1 00
PEPPERS.— Twelve Squash, George W. Jameson	3 00
Second, Charles N. Brackett	2 00
Third, Mrs. Mary T. Goddard	1 00

Any other variety, Charles N. Brackett, Ruby King	$3 00
Second, Robert McLeod, Bell	2 00
Third, " " Brazilian	1 00

Gratuities: —

Capt. S. A. Merrill, Squashes	2 00
John Parker, Collection of Squashes	2 00
Benjamin K. Bliss, Collection of Squashes	1 00
Francis Blake, Corn	1 00
Hon. Aaron Low, Collection of Tomatoes	3 00
Robert McLeod, " " Peppers	3 00
George Reynolds, " " Herbs	1 00
Varnum Frost, "	5 00
Walter Russell, "	5 00
Warren Heustis & Son, Collection	4 00
Capt. S. A. Merrill, "	3 00
Charles N. Brackett, "	3 00
Charles E. Grant, "	3 00
P. G. Hanson, "	3 00
George F. Stone, "	1 00
Joseph S. Chase, "	1 00
Mrs. Mary T. Goddard, "	1 00

OCTOBER 22.

Gratuity:—

Benjamin P. Ware, Cauliflowers	1 00

EXHIBITION OF WINTER FRUITS AND VEGETABLES.

NOVEMBER 19.

CUCUMBERS.— Pair, John L. Gardner	3 00
CABBAGES.— Three Red, S. P. Buxton	3 00
Second, George Jacobs	2 00
Savoy, S. P. Buxton	3 00
BRUSSELS SPROUTS.— Half-peck, John L. Gardner	3 00
CAULIFLOWERS.— Four specimens, William H. Teele	3 00
Second, A. M. Knowlton	2 00
Third, John L. Gardner	1 00
CELERY.— Four roots, Warren Heustis & Son, Paris Golden	3 00
Second, Warren Heustis & Son, Boston Market	2 00
Third, John L. Gardner, Veitch's Pink	1 00
LETTUCE.— Four heads, H. R. Kinney	3 00
Second, John L. Gardner	2 00
Third, Warren Heustis & Son	1 00
TOMATOES.— Twelve specimens, Winter Brothers, Lorillard	3 00
Second, Winter Brothers, Early Essex	2 00
Third, George Sanderson	1 00

Gratuities: —

Hon. Aaron Low, Collection of Tomatoes	2 00
Benjamin P. Ware, White Globe Turnips	1 00
Calvin Terry, Onions	1 00
Charles E. Grant, Collection of Watermelons	3 00
Walter Russell, "	3 00
P. G. Hanson, "	2 00
Warren Heustis & Son, Collection	2 00

FIRST-CLASS CERTIFICATES OF MERIT.

June 4. Walter Russell for White Box Radishes.
" 10. Peter Fisher, for New Forcing Tomato, Conference.

REPORT

OF THE

COMMITTEE ON GARDENS,

FOR THE YEAR 1892.

By JOHN G. BARKER, Chairman.

The Committee take pleasure in bringing to you their report for the past season. The difficulty of so arranging the prizes that they may be adapted to the seasons as they come and go, has been found to be greater than one would naturally anticipate. We have had comparatively few applications for the various prizes, but have been invited, more than usual, to visit places for which no special prizes had been offered; notably the Aquatic Garden of W. W. Lee of Northampton, the Rose Houses of Charles V. Whitten of Dorchester, and the commercial establishment of Fisher Brothers & Co., Montvale. We may properly call your attention to the many changes that are constantly taking place in this department of our work, particularly that of summer bedding or ornamentation of Gardens, Public Grounds, Parks, etc., which are very noticeable, and we hail with joy the present tendency to make the ornamental department, especially of private grounds, more permanent. The usual, and we may say stereotyped, plan of using tender bedding plants, especially the ornamental foliaged varieties such as Coleus, Iresine, etc., for summer decoration is gradually being less used; perhaps on account of the very short time — at the most only a few weeks — that they are of any value, as they cannot be planted out until quite late, and are among the very first that fail with the cool nights of the autumn season. A new interest seems to be developing in favor of flowering plants, where the tender varieties are still used. This is commendable,

and now that we have the elegant Crozy Cannas, the magnificent Tuberous Rooted Begonias, with the improved varieties of Pelargoniums, the delicious heliotrope, and other flowering plants that might be named, we are glad that the overdone foliage bedding is being superseded. With the great variety of herbaceous plants, the flowering shrubs, the beautiful evergreens, and so many roses adapted for bedding purposes, no one need regret that he has no greenhouse for tender plants. Without them he can now have an interesting garden, and his grounds may be brilliant and beautiful. While both tender and hardy plants will continue to be used, we are glad to report an improved taste everywhere apparent. We are admonished, however, to cease this line of thought, although it ought to be very thoroughly discussed and developed, and we hope in the near future it may be, but our duty now is to report our doings.

Rose Houses of Charles V. Whitten, Dorchester.

On March 16, the Committee were invited to visit the Rose houses of Charles V. Whitten, which are fifteen in number and are mainly devoted to the cultivation of Roses for their flowers. They are divided into two sections, known as the eastern and western ranges. The seven houses of the eastern range are each ninety feet long and about twenty feet wide, three-quarter span, and heated by hot water. In them are grown three tender roses, viz.: The Bride, Madame Hoste, and Papa Gontier.

It may be interesting to know the opinion of others of the value of these varieties; some one signing himself "Ridgewood," in London, April, 1891, says: "From the first introduction of this grand rose, The Bride, it has been a favorite with me. I have in my room now a fine bloom that was cut nine days ago and is still quite fresh, while its shape is as good as the day it was brought to me. I consider it the best of all white roses to stand. It is very free flowering, and when one has a stock of plants and so can choose good sound buds for propagating, it is an excellent grower. I think that the chief cause of many good new roses being discarded before they are thoroughly tried, is owing to their being over propagated. The Bride is an example of this, as during the first few years of its being in commerce it was a weakly grower compared with what it is now."

T. W. Girdlestone in "The Garden," Vol. 36, writes of Mme. Hoste: "This new Tea, like not a few of the roses, and especially of the tea-scented varieties, sent out by the famous Lyons house, has proved to be, in every sense of the word, a host in itself. If the French growers had sent us nothing else besides this variety and L'Ideal, these two roses would still have sufficed to make the season notable. Mme. Hoste can hardly be more exactly described than as a pale lemon colored Anna Olivier. In habit, mode of inflorescence, freedom, and form of flower, the new rose closely follows the older variety, the main difference lying in their entire distinctness of color, while perhaps the flowers of Mme. Hoste are inclined to come generally a little larger than those of Anna Olivier. The constancy of the novelty is also exceptionally conspicuous, almost every bloom being characteristic in form as well as of good size and color, and there can be scarcely a doubt that Mme. Hoste will take a prominent position among the first-rate Teas."

"A. H." in the same volume says: "Papa Gontier is a favorite rose with Americans, the flowers being in great demand for button-holes. It is only semi-double when fully expanded, but its value consists in its long, large bud, which is of fine form and distinct color, being bright rose shaded with carmine and crimson. It is a Tea, but so much does the growth, form, and color of the flowers resemble those of a monthly, that it might really be classed as a very fine one, and grown with them."

Mr. Whitten's western range contains eight houses, running in length from seventy-five to one hundred and eighty feet. In these are grown Catharine Mermet, American Beauty, Ulrich Brunner and Mrs. John Laing; also Chrysanthemums and Lilies in their season. These houses are heated by steam.

Catharine Mermet is a fine Tea rose; flesh color, with the same silvery lustre seen in La France; it is large, full, and well formed; not very productive, yet not a shy bloomer; very beautiful in the bud and when the flowers expand they exhale a delightful perfume. It is the finest of all the Teas.

American Beauty is of a deep, rich rose color; large globular flowers, of fine shape; a good rose for pot or forcing purposes, and of superb beauty. Not alone do its deep, glowing color, its elegant, imbricated, form, its supporting foliage of rich green, distinguish it; with all these it combines a peculiar and distinct

fragrance, hard to describe but most delightful to inhale. Not for many years has a finer rose been offered, and it has attained deserved popularity.

Mrs. John Laing is an elegant rose, of a soft pink; flowers fragrant, large and finely shaped; vigorous and profuse, valuable for the garden, and acknowledged to be superior for early forcing.

The house of Ulrich Brunner roses, which the Committee were specially invited to examine, was stocked with small plants, out of three inch pots, on the 8th of June, 1891, in five inches of soil; the entire stock being on their own roots. They made very vigorous growth during the summer, which was carefully ripened during the fall and winter months. They were started on the 15th of January and flowers were cut from them April 1, and in great quantity during Easter week. Mr. Cotter, the gardener, informed us that one dealer alone took as many as four thousand blooms on the Thursday, Friday, and Saturday before Easter. This variety is a bright cerise red, large and full; a strong grower, and excellent for forcing, being a continuous bloomer.

The roses grown by Mr. Whitten have been briefly described, as they are varieties of special merit, and this is the first invitation we have had to visit any rose houses. We take pleasure in attesting to the care and skilful cultivation bestowed upon them. They were all remarkably healthy, without a sign of mildew, and in every respect very clean. The house of Ulrich Brunner was splendidly grown, and, like the others, in every respect highly commendable. To Mr. Cotter, for his kindness and attention to the Committee, we tender our hearty thanks, and sincerely congratulate him on the success he has achieved, in growing such superior roses.

Greenhouses of Dr. C. G. Weld, Brookline.

On the 19th of March, the Committee again enjoyed a visit to the greenhouses of Dr. C. G. Weld, Brookline. This is a place where, no matter how frequently you go, there is something to interest you and to admire. The same skill and care were evident, as we passed through the various houses on this occasion that we observed on our previous visit, March 13, 1891, and as you have so recently received the report for that year, and we can say but little more than a reiteration of what we said there, we ask your

careful reperusal of that part of our report, found on pages 340 to 345 inclusive, Part 2, of our TRANSACTIONS for 1891. We will however, add some remarks upon the principal attraction at this visit, which was the house where the Cinerarias were grown. The centre bench was filled with as fine plants as were ever seen. To describe them would be a task beyond our ability. You all know that the Cineraria is a very valuable conservatory decorative plant, blooming during the winter and early spring months, and it is no less valuable for exhibition purposes. The colors are extremely brilliant, the selfs particularly so. Comparatively speaking it is but a few years since the Cinerarias were a lot of poor things, with narrow, flimsy petals, and one tall, unsightly stem; but the desire for improvement has stimulated the growers to such an extent, that perhaps from no other soft-wooded plant grown have their efforts produced so many nearly perfect new varieties. The best plants are dwarf and compact, and when properly grown produce splendid trusses, in some cases of almost perfectly formed flowers. As we have already intimated, nearly every plant upon the central bench in Dr. Weld's cineraria house seemed to be a perfect one. On the upper shelf of this bench some fine small specimens of *Acacia pubescens* were arranged, which added very much to the attractiveness of the house. We cannot omit to mention, in connection with this plant, our surprise that Acacias are so seldom seen in plant collections; of all the New Holland plants few are so interesting. The strange variety in the leaves, or perhaps more properly, the *phyllodia*, which are merely flattened, leaf-like petioles without blades, is a curious peculiarity. A large number of species bear no true leaves, but these phyllodia, which, however, perform the function of leaves. The species to which we have alluded, is a neat plant for a pot or conservatory border. It is rather delicate, umbrella shaped, with stem pubescent. Racemes are produced singly from the axils of the leaves; they are about three inches long, the flowers globular, small, and yellow. It is rather slow growing, but one of the best.

The side benches in the house were filled with flowering plants in variety, and as a greenhouse of flowering plants, the entire collection was for health and vigor of growth, highly creditable to Mr. Finlayson, the gardener, the fruits of whose skill have so frequently been witnessed in the plants shown at our exhibitions.

Stove and Plant House of George A. Nickerson, Dedham.

Our next visit was on the 29th of March, to the greenhouses of George A. Nickerson of Dedham. The particular house which was entered for the prize, is a large curvilinear-roofed structure, eighty-seven and one-half feet long, by twenty-five feet wide. The glass is sixteen by eighteen inches; the panes for the three lower rows were cast in Germany of the required curve. The rafters are of iron and the sash bars are of hard pine. The entire house is put together with screws in such a way that it can be taken apart without the least injury. Cement and gravel foundations and brick walls covered with copings of granite, render it a very substantial building.

Upon entering the house our attention was particularly directed to the large and handsome specimen Crotons. The finest plant is a superb specimen of Queen Victoria, ten feet high, and twenty feet in circumference. This is undoubtedly one of the best varieties, and the handsomest of the large-leaved kinds, the leaves being variously mottled with bright green, crimson, and creamy-yellow; for richness of color it is unequalled.

Croton interruptum, belongs to the narrow-leaved series. Its leaves, like those of *C. angustifolium*, are pendulous, but many of them are of most fantastic forms; in some instances assuming a spiral form, in others having only the mid-rib for two inches or more; the upper surface is a rich purple or perhaps dark reddish green, with yellow tinge, and a deep crimson mid-rib; the under surface is dull purplish green. The free habit of the plant, makes it very desirable for decorative purposes. This specimen is fourteen feet high and sixteen feet in circumference.

C. excelsior has a compact and graceful habit, rendering it suitable for a decoration. The leaves are four inches wide, twenty-two inches long, and the veins are rosy crimson, much suffused with yellow, and the young leaves are very highly colored. It is one of the finest Crotons, especially in its young state. It originated with Mr. Monteith, Mr. Nickerson's gardener, who says it is a sport from Challenger. The habit is much like that of the parent plant, but it is altogether of a richer growth and very much more highly colored.

C. Warrenii, is a superb variety of free growing habit, producing spiral linear-lanceolate leaves, which are two feet and more in length, by one and one-half inches broad, pendent, arching. Its color is dark green, irregularly mottled and suffused with orange-yellow and carmine, which with age becomes a beautiful crimson. This is a graceful, richly colored Croton, and is pronounced by many to be the best of all narrow-leaved varieties; it is fine as a decorative or exhibition plant, and as an object for the dinner table cannot be equalled.

C. variegatus is one of the best known of the Crotons, and is largely cultivated. The leaves are oblong, tapering to a point, from six to nine inches long and about two inches broad; they are of a bright shining green color, the mid-rib and all primary veins being margined with rich golden-yellow; the growth is compact, and very ornamental.

C. Youngii is of beautiful form and a very robust growing plant, producing leaves from ten to twenty inches long, and nearly an inch in width; the upper side is dark green, irregularly blotched and spotted with pale yellow and rosy red.

C. Disraeli. From the LONDON GARDEN, Vol. 36, page 337, we copy this description: "This belongs to the Fish-tailed Crotons, which was the name given them by my friend Charles Moore, the director of the Public Gardens in Sydney, Australia, who first found and brought this section to England. The leaves are three lobed; when young the centre is light green, blotched with yellow, and margined with the same color; with age the yellow blotches in the centre become rich orange-yellow, and the margins change to reddish-scarlet."

C. chrysophyllum has narrow leaves from six to eight inches long with very bright yellow on the young growth, and makes a good specimen plant.

C. Pilgrimii is a fine, bold-looking Croton, with leaves from six to nine inches long by three inches broad, ovate-acuminate; pale green, with deep golden markings, heavily suffused with rich pink, the petiole and costa being of the same color; a very fine variety.

C. undulatum. A superb form of this beautiful genus; the leaves are oblong-acuminate, and undulated or wavy at the edges; the ground color is very deep green, upon which are scattered numerous blotches of deep yellow and vivid crimson; it is one of the handsomest varieties in cultivation.

C. Veitchianum. The leaves of this variety are of large size, frequently measuring upwards of a foot in length, and two inches in width, oblong-acuminate in shape, with wavy edges. They are beautifully colored, the ground being a rich green, with a broad band of creamy-yellow along the centre, which is again suffused with reddish-pink; a superb variety.

C. Challenger has long leaves; mid-rib at first creamy-white suffused with red, deepening to bright carmine; it is one of the best.

C. Weismanni is of a close, dense habit of growth; the leaves are narrow, and a foot or more in length; ground color a bright green, mottled and striped with bright yellow.

C. nobilis. The leaves are narrow and quite long, the color a mixed yellow; the centre veins are reddish on the old leaves. It makes a fine centre plant.

C. Andreanum is of neat habit and free growth, with highly colored foliage. This plant is twelve feet high by twenty feet in circumference, and is a magnificent specimen.

It is seldom that such splendid plants as these of which we have tried to give you descriptions, are seen. As large specimens, either for exhibition or decorative purposes they are indispensable, for their habit and color produce an effect which is not possible with any other plants. They are quite easily managed, and when grown as small specimens are among the finest that can be used for dinner-table decoration, or for vases in the sitting-room or parlor. Until quite recently it has been supposed that Crotons must be kept indoors and were not adapted to summer decoration in beds; those who visited the Public Garden, the past summer, undoubtedly noticed the Crotons that were planted out in the vicinity of the Washington Monument, and how well they retained their beautiful coloring. Mixing them with other foliage plants was a marked success, and a happy change from the usual way of ornamenting this much visited place. A visit to Girard College, Philadelphia, where the bedding out is a specialty, gave us much pleasure, because of the magnificent beds of Crotons which were planted in the grounds, out of the pots; in some cases in groups by themselves, in others with Pampas Grass in the centre, or here and there a Retinospora, and bordered with Acalyphas; again in groups with an edge of *Abutilon vexillarium* or *Aphelandra Leopoldii.* They were certainly the most brilliant

colored beds I ever saw. We are told that at Newport, R. I., Crotons are used for bedding out with equal success. When such plants as we have named will stand our summer sun, what place or need is there for the Coleus or other inferior foliage plants?

We have digressed somewhat from the account of the plant house, to speak of the uses of Crotons, but will now return.

In addition to the Crotons, among the many other fine plants we saw was a handsome specimen of *Phœnix rupicola*, an elegant and distinct palm, with long, pendent, arching, pinnate leaves, slightly clothed with brown filaments; this species is well adapted for table decoration, and being a greenhouse plant stands well.

Kentia Belmoreana, another elegant palm, is a valuable addition to any collection. Its leaves are pinnate, dark green, and so beautifully crisp as to gain for it the name of the "Curly Palm." It is very ornamental, and well adapted for decorative purposes.

Kentia Wendlandiana is an elegant Palm, belonging to the pinnate leaved series, introduced from Queensland. The leaves have numerous unequal segments, usually toothed at the apex. It was one of the twelve plants with which William Bull of Chelsea, England, gained the first prize at the International Horticultural Exhibition, at Ghent, some years ago.

In addition to the plants mentioned, which in every respect were superior specimens, were many others usually found in all good collections, such as Azaleas; a good collection of Orchids, especially Cattleyas; some fine Ferns; a good variety of Cyclamens, and other foliage or flowering plants.

Varnum Frost's Houses of Forced Vegetables, Arlington.

Comparatively speaking, it is but a few years — certainly within the memory of many of our members — since we could not get, in the early spring, the vegetables we now have all the year round. In the winter months, lettuce and cucumbers, produced in our climate, were out of the question. The South was depended upon for the earliest varieties, and that resource, with the hot-bed, were the only facilities known for supplying early vegetables; and the latter was used only at the risk of its sometimes losing its heat before the crop was matured, and even if that did not occur, yet with a cold and backward season these crops would be retarded

until quite late. But skill and study have produced marvellous results, and now the amount of glass devoted to the production of forced vegetables can be enumerated by the acre. If the figures could be obtained of the amount of forced vegetables sent from the neighboring towns to the Boston market, we think they would be surprising to most of the members of our Society. Your Committee have long felt that this great horticultural industry should receive a share of their attention. Therefore, for several seasons we have made special efforts to induce those who are engaged in this business to compete for the prizes offered by our Society. Personal appeals have been made by the Chairman, in the shape of special communications to those who, we had hoped, would compete. But Varnum Frost, of Arlington, who is always ready to advance the interests of the Society, is the only person who has entered a house of this kind, in competition.

The Committee visited Mr. Frost's houses of forced vegetables, April 30, for the purpose of inspecting his house of forced cucumbers.

Mr. Frost makes the following statement:

ARLINGTON, Mass., October 31, 1892.

Mr. J. G. BARKER, *Chairman of the Garden Committee of the Massachusetts Horticultural Society:*

DEAR SIR:— In reply to your letter of the 25th inst., I furnish you the following items concerning my House of Forced Vegetables:

1. Size of House, including Head House, 194×25 feet.
2. Number of crops:
   Two crops of Lettuce.
   One crop of Cucumbers.
   One crop of French Breakfast Radishes, grown with Cucumbers.
3. Quantity of each crop, (approximate):
   Lettuce, 700 dozens each crop.
   Cucumbers, 18,000.
   Radishes, 5,000 bunches.
4. Mode of heating, steam.
5. Plants are so started, as to time, that one crop follows another without intermission. Success with the crop depends of course very largely on having good plants, raised from carefully selected seed.

6. General remarks concerning cucumbers:

The plants are set two in a hill and finally thinned to one. The hills are two feet apart. In this house I use for the Cucumber crop about three cords of horse manure placed in four trenches, one and one-half feet deep by one foot wide, running the length of the house. The manure is covered with about seven inches of soil. Cucumbers are picked in seventy days from the sowing of the seed.

Any further information I will furnish if desired.

Very truly yours,

VARNUM FROST.

ESTATE OF NATHANIEL T. KIDDER, MILTON.

It is several years since any application has been received for the H. H. Hunnewell Triennial Premium, but we are glad to inform you that we had one this year from Nathaniel T. Kidder. On one occasion before we called your attention to some special objects of interest on this estate. The Report of 1891, in our TRANSACTIONS, Part 2, pages 336 to 338, contains a full account of the Greenhouse, which was awarded the first prize; and on pages 345 to 348, is given a partial list of the excellent collection of plants in the Herbaceous Garden, which also received the first prize. The estate of Mr. Kidder is situated on Adams Street, Milton Hill, and contains eighteen acres. The mansion is about six hundred feet from the street, and is approached by an avenue, on one side of the lawn. The avenue is shaded on the left by large Elm trees, and on the right side by some fine specimens of Norway Spruce. The lawn is about three and one-half acres in extent, and on it are some fine specimen Elm and Oak trees. At one side of the house are planted some fine trees and shrubs; with choice evergreens, such as *Taxus Japonica*, Araucarias, and Retinosporas, backed by a large grove of deciduous trees of natural growth. On the opposite side is a fine bed of Rhododendrons, and several groups of Retinosporas. In the rear of the house is the kitchen garden and here a general collection of vegetables was growing. It is well sheltered from the north winds, and from the early and late frosts. There are a number of Apple trees, the most of which are about forty years old, the Baldwin and Rhode Island Greening being considered the best. There are twenty-two

varieties of pear trees, some of which are not yet producing fruit. Small fruits are grown in quantity, including, of Blackberries, Dorchester and Kittatinny; of Raspberries, Cuthbert and Golden Queen; of Strawberries, ten varieties, those doing best being Charles Downing, Jewell, and Manchester; of Hardy Grapes, Concord, Moore's Early, and Niagara, all of which give good results. Peaches, Plums, and Filberts are also grown in small quantities.

Trees and shrubs are grown in large quantities. Of trees, we noticed that Oaks, Maples, Hickories and Pines predominated. During the past thirty years many native and foreign trees and shrubs have been planted, but very few of variegated foliage or weeping trees or variegated shrubs have been included.

Noticeable among the shrubs are the large specimens of *Pyrus Japonica*, Deutzia, Syringas, and *Rhododendron maximum*. A large quantity of shrubs of more recent introduction occupy a prominent place near the first greenhouse, and the native shrubs are well represented, The collection of Hardy Herbaceous Plants, of which there are between four hundred and five hundred varieties, is also planted in this vicinity. Mr. Martin, the gardener, remarked that these are fast taking the place of soft-wooded, bedding plants, as they give a supply of flowers from early spring until late in the fall.

There are six greenhouses, one of which is a lean-to, for growing plants for cut flowers. From this is a passage-way in which the walls are covered with moss for growing Ferns and Anthuriums, which were in a most luxuriant condition. The two span-roofed houses, running north and south, are filled with Foliage plants, Ferns, Palms, and Orchids, but contain also Gloxinias, Streptocarpuses, Achimenes, and other flowers in their season. A three-quarters span-roofed house for plants needing less heat, is used more or less as a conservatory for showing plants as they come into bloom. Two vineries, planted principally with Black Hamburgs, which are always healthy and vigorous, have each produced very even well ripened crops of fruit. There is one small rose house, of which a small portion is devoted to cucumbers and tomatoes; and a north house, used chiefly for winter storage, and where half-hardy plants are grown and flowered; at the time of our visit, the roof of this last named house was covered with *Lapageria rosea* and *L. alba* which were very fine plants.

There are also convenient pits and cellars, which are used for the storage of Azaleas and many other half-hardy plants during their period of rest; and a large quantity of frames for growing Violets and Polyanthuses — also lettuce, parsley, mushrooms, and numerous other things.

This is little more than on outline description of the premises, with the appliances for horticultural work, and a summary of the many good things that are grown on Mr. Kidder's estate. There are many things that might be mentioned separately, which we shall endeavor to bring to your notice during the next two seasons. The excellent condition of the grounds and the skilful cultivation of all the productions, justify the Committee in unanimously approving the entry for the first time.

Estate of Francis Brown Hayes, Pine Hill, Lexington.

The Committee, with a large company of invited guests, visited these extensive grounds, June 13, the special object being the fine display of Rhododendrons, of tender and hardy varieties, under the tent. In the previous reports — for 1883, 1886, and 1888 — not only the Rhododendrons, but as far as advisable, the various other objects of interest here have been carefully mentioned, and to say anything additional now would be, in a measure at least, to reiterate that with which you have already been made familiar. We will only say that the Rhododendron tent was filled with as fine specimens as usual, and that the erection of a stage at the end of the tent nearest the mansion, by enabling visitors to view the plants from an elevation, afforded the means of enjoying their beauties to better advantage than on our previous visits.

Fisher Brothers & Co., Montvale.

August 25, the Committee were invited to inspect the grounds and greenhouses of the New England Nursery Co., Montvale. It is not very often that we are invited to visit a commercial establishment. Unlike many such places, where everything is grown, here specialties only are cultivated, and it is a pleasure to note that each house was free from the slovenly and dirty conditions so frequently found in places of this class. The plants all gave abundant evidence, by their healthy appearance, that skill

and care had been bestowed upon them. For convenience we will take the houses in the order in which they were seen.

No. 1 is one hundred feet long by twenty-two feet wide; the centre bed is devoted entirely to the cultivation of *Asparagus plumosus*, and the side benches to Cyclamens. It may not be out of place to mention here that in our opinion the wisdom of cultivating extensively one good thing, in preference to so many of little value, is abundantly proved in this case. It is doubtful whether so good a return from the same amount of space could be obtained from any other single variety of plant that might be grown. *Asparagus plumosus* has of late years attracted much attention, and its value in a cut state is highly appreciated. The temperature of a dwelling house seemingly has little effect on it, as it will keep in water two or even three weeks; this quality with its graceful and elegant habit make it of the greatest value for the cut flower trade.

Of Cyclamens there were seventy-eight sashes. It is unnecessary to take your time in trying to impress upon you the value of the Cyclamen for decorative purposes, in the conservatory or the window, for the splendid displays made at our exhibitions of late years have given abundant evidence of its value. Our late associate, Claudius B. Gardiner, of Newbury, was among the first who made a specialty of them. James O'Brien, of Jamaica Plain, will also be remembered as a specialist in this plant. Now no greenhouse or window garden is complete without them. All who are interested in the cultivation of the Cyclamen, are invited to read the excellent article by Mr. Finlayson, on page 342, Part II, of our TRANSACTIONS for 1891.

Houses Nos. 2 and 3 are each one hundred feet long by twelve feet wide and are devoted to Adiantums for cutting.

House No. 4, having the same dimensions as the last, was devoted to young plants of Adiantum when we were there, but later would be filled with Cyclamens.

House No 5, of the same dimensions, is devoted to *Adiantum Farleyense* alone. A brief notice of this beautiful fern will not be out of place here. It is described by William Bull as "The most magnificent variety of this handsome family; the fronds are of the size and form of *A. trapeziforme*, but pendent, and all the large pinnules are deeply fringed and crisped." In the "Book of Choice Ferns," we find it described as follows: "This truly

magnificent Adiantum, a native of Farley Hill, Barbadoes, by far the most beautiful of the whole genus, and not inappropriately called the 'Queen of Maiden Hair Ferns.' has attained such a degree of popularity as to be extensively known under that name; no description can do it justice; it is magnificent, and unrivalled for exhibition purposes."

House No. 6, is one hundred feet by twenty-two feet, and is devoted to Gros Colman Grapes, trained under the rafters, and *Asparagus plumosus* in the centre.

House No 7 is one hundred feet by twelve feet, and is filled with Adiantums for cutting.

House No. 8 is a large span-roofed house in which Marie Louise violets only were growing.

In the garden the following varieties of Cannas were noted:

Admiral Courbet has handsome deep green foliage, with bright yellow flowers spotted with red.

Adolph Wieck is one of the best, flowering very abundantly; the flowers are large and of a brilliant scarlet; it is a grand bedder.

Antoine Chantin is a dwarf variety with pure yellow flowers, having a spotted orange lip; an excellent kind.

Antonin Crozy is scarlet or rich crimson, slightly feathered with yellow in the lower part of the flower.

Baronne de Sandrans is somewhat in the style of Mme. Crozy, but of a medium type in size of both flower and foliage. It is exceedingly floriferous and will undoubtedly become very popular.

C. Bronté grows three feet high, has dark foliage, and its flowers are light pink.

Comtesse Marie de Lusignard. The foliage is three feet high, and flower-spike four feet, with flowers of bright cherry; it seeds freely.

Duc de Mortemart shows very large bright yellow flowers, spotted with red; the foliage is green.

Epis d'Or is very handsome, with orange colored flowers.

Francisque Morel is a striking variety, with a combination of rich crimson flowers and deep green foliage.

François Corbin has deep green foliage; flowers canary yellow, thickly spotted with deep carmine; a distinct variety.

Geoffroy St. Hilaire has handsome dark foliage and large orange-red flowers.

J. Cordioux has dark foliage three and one-half feet high; flowers of a dark red color on a spike four and one-half feet high.

Jules Chretien is of dwarf habit and sturdy growth; the flower spikes are about two feet in height; the flowers are of a dark crimson, trusses large; a striking kind.

La Guill has foliage three and one-half feet high; flowers of old gold color at first, becoming lighter, on a spike four feet high.

Madame Crozy is one of the very best and is specially noticeable on account of the markings of the flower being very clear and distinct; it is a green leaved variety, with large blossoms of a bright scarlet color, edged with a clearly defined, but narrow band of gold.

Madame Just bears rich orange-yellow flowers, shaded to buff on the edges of the broad, firm petals.

M. Cleveland is a very free bloomer, producing fine, clear red flowers.

Mme. Oriol. Bright green foliage; flowers of an orange salmon shade, tinted with lake; medium size.

Princesse de Lusignan is of red carmine tint, very fine.

Souvenir de Jeanne Charreton. The foliage stands two and one-half feet high; the flowers rise to three and one-half feet high, and are dark cherry colored.

Star of 1891 has scarlet colored flowers, is of dwarf habit, and is said to be better adapted to pot culture than to out-door gardening.

Vesuvius. Foliage three and one-half feet, and the flower spike four and one-half feet high; the flowers are of a bright red color and very far apart on the spike, giving it a loose appearance, but as a cut flower in a vase it is useful.

We have taken pains to describe as accurately as we can the varieties grown here, hoping that it may aid those who wish to make a collection of these highly desirable decorative plants. We know of none that possess the desirable qualities of both foliage and flower equal to this new race of Cannas. Another point in their favor is the long season of flowering, from May to September, or even October as was the case last autumn. The succession of bloom in a bed of Cannas is strikingly varied and brilliant; the leafage of itself is tropical, fresh, and handsome, and the colors there displayed are very diversified. They like a deep, rich soil, and an abundance of moisture. No other intro-

MR. LEE'S FIRST TANK FOR AQUATICS.

duction of late years has proved more valuable or of greater usefulness than the Cannas. For the garden in summer, for pot plants in the conservatory, or for cut flowers they are equally useful.

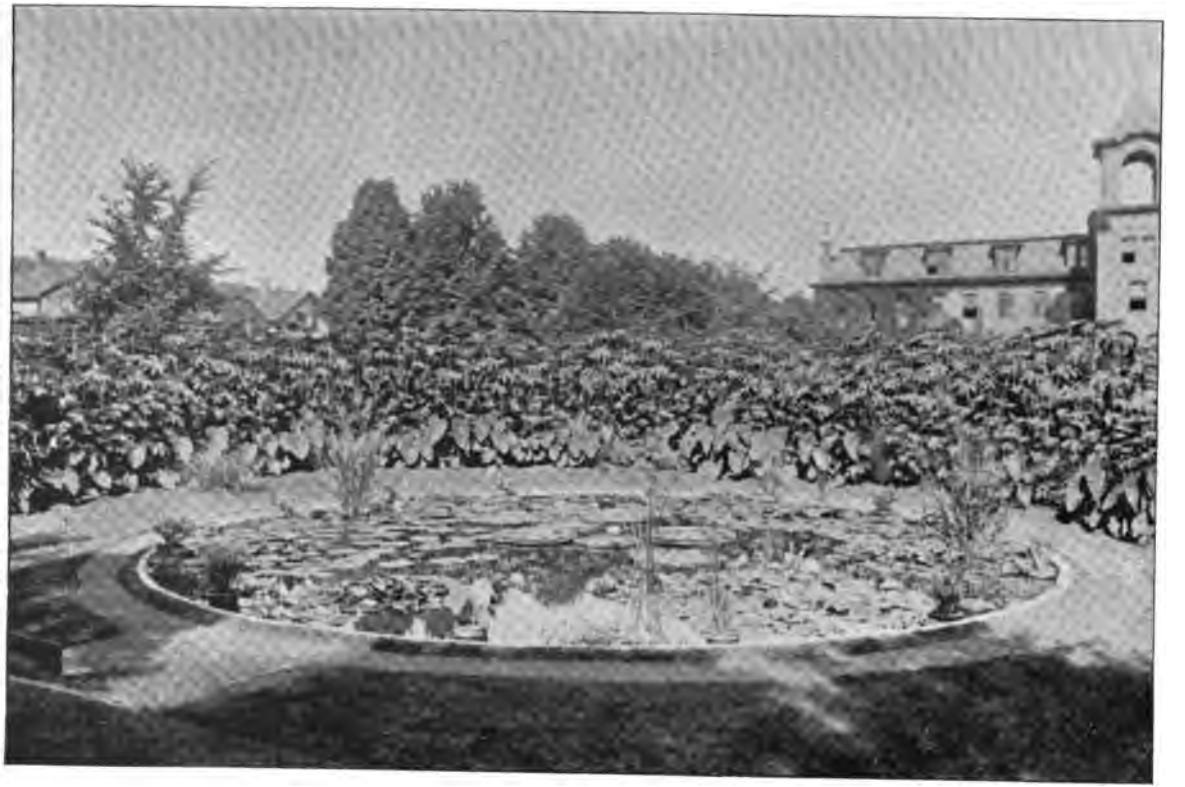
W. W. Lee's Aquatic Garden, Northampton.

The Committee were invited to inspect the Aquatic Garden and grounds of Mr. Lee, and discharged that pleasant duty September 2. I am expressing the sentiment of the entire Committee when I say that it was a very satisfactory visit. We not only found objects different from anything we have ever been invited to visit before, but that Mr. Lee had stepped entirely out of self and had planned an attraction for the enjoyment of others, who could in no other way enjoy what he had provided for them. Usually a garden of this kind is located on the home grounds, or near the residence of the owner, but in this case the grounds about Mr. Lee's cutlery manufactory have been laid out as a lawn, and the ponds located where the many rather than the few can enjoy them all the time. The accompanying photographs show the connection between the factory and the grounds. What was once a barren and desolate waste — having been devastated by a flood — is now a thing of beauty and the joy of thousands.

Approaching the grounds from Northampton we first come in sight of the neat cottages occupied by the workmen in Mr. Lee's manufactory, which are in good order, the grounds about them being nicely kept, with beds of sub-tropical plants — Ricinus, Colocasia, and Coleus — arranged at intervals, which give an attractive and pleasing appearance to the premises, making the homes pleasanter and happier. We next come in full view of the factory, a brick building handsomely covered with *Ampelopsis Veitchi*. The avenues are conveniently laid out and with the lawn about the buildings are well kept. Trees and shrubs have been introduced which in time, when they have attained to a somewhat larger size, will add materially to the attractiveness of the surroundings. Directly opposite the office-entrance to the factory, a small pond of water lilies is located. This was Mr. Lee's first attempt at aquatic gardening; a description of it is not called for here, as the larger one contains most of the varieties grown in this one. Many persons would be glad to have their grounds adorned by one like it, although Mr. Lee thinks it quite insignificant, as it is when

compared with the larger pond; but it is a very pleasing introduction to the grounds, and to the larger one represented in the picture opposite, in which the pond has the appearance of being quite close to the factory, but in reality is at a distance of one hundred feet or more from that building. You will notice also a border of sub-tropical plants on the further side of the pond, with a broad belt of grass in front which heightens the charming effect of the plant border. If this border were not introduced the beautiful effect would be lost, as the visitor's attention would be more or less attracted from the near view to what is beyond. By a simple arrangement of water pipes on the surface of the plant border, but which are hidden by the plants, a constant and even supply of moisture is maintained in this border, thus assuring the luxuriant growth of the plants, which are certainly very fine if not unequalled. As you readily see, the principal plants are Ricinus in variety, and Colocasias, enlivened by some elegant clumps of that beautiful grass, *Eulalia gracillima univittata*.

The pond is about three feet below the surface of the avenue, and is approached by a flight of steps; it is surrounded by a narrow gravel walk with a line of sod between it and the water. This walk does not detract in the least degree from the beauty of the scene, while if it were not there the lawn would be much worn by the constant walking upon it. The larger pond is forty-two feet in diameter; at the time of our visit the most conspicuous plant in it was *Victoria regia* var. *Randi*, which is of quite recent introduction and is a very desirable and showy variety of *V. regia;* the vertical edges of the leaves rise higher, and the flowers, though opening white, change to a deep crimson. In the latter part of September we visited the Botanic Garden, at Washington, D. C., where the *V. regia* was growing in the fountain basin; although past their prime they showed that at an earlier date they were very fine; they had no artificial heat, but Mr. Lee has that provision, so that the water is kept warm enough to grow it successfully. The varieties of *Nymphea* are *N. rubra*, *N. gigantea*, *N. dentata*, *N. Zanzibarensis*, *N. Sturtevanti*, *N. Devoniensis*, *N. sulphurea*, and the superb hardy varieties, *N. alba candidissima*, and *N. Marliacea chromatella*. The following plants in pots were also included — *Papyrus antiquorum*, *Limnocharis Humboldtii*, *Eichornia crassipes major*, and other floating plants. As there are several excellent catalogues devoted exclusively to aquatic plants, those who are interested in their



MR. LEE'S SECOND TANK FOR AQUATICS.

cultivation, will find their time well spent in looking them up. The following extracts from letters of Mr. Lee to the Chairman of this Committee will be of interest:

NORTHAMPTON, Mass., Nov. 4, 1892.

MY DEAR MR. BARKER:—

In reply to your request of the 2d inst., I have to say that I always have admired flowers, but never realized before I became a manufacturer how important a part flowers and plants, particularly water lilies and other aquatics, can contribute to soften the surroundings of factory life. Where the lawn now is, was a barren field of gravel with here and there a weed. This spot had to be grassed over and vines of *Ampelopsis Veitchi*, Bignonias, etc., started by the mill to cover its bare walls; then some beds of Cannas, Caladiums, Coleus, etc., were planted, but the lily pond was introduced here in 1890. It was the result of a visit to my friend, L. W. Goodell, at Pansy Park, Dwight. I saw his pond in 1889, and from that time to the present I have become very much interested in the subject of aquatics, and my employés share that interest with me. In 1891 I built the pond for *Victoria regia*, and this season many of the tender varieties of lilies were introduced with good effect. James Brydon of Yarmouthport, has done much to help me to success by telling me his own experience; in fact all the gentlemen of your Society with whom I have spoken have given me, without reserve, many hints. There seems to be something in the cultivation of flowers that makes the experience of one free for the benefit of all, and this good will is worth more than can be estimated. I have now made a third pond, on the bend of our river and in this it is intended to plant the hardy varieties of Nymphæa with many wild plants set naturally about the pond. I don't know where the matter will end, as the number of lilies is increasing each year and space must be found for all. Of one thing however I am sure, I would not live without them, if it were possible to have aquatic plants, on my own account, and also for my employés and their families. During the season the ponds are visited by thousands of people; and on Sundays, and in the evenings when illuminated, the enjoyment of the public is most gratifying to me and worth many times the expense of maintenance.

Yours very truly,

W. W. LEE.

We have tried as best we could to stretch your imagination to this lovely aquatic garden, and we are sure that this new departure by Mr. Lee will be a stimulus to others to do likewise. The many hardy varieties that can be grown without heat enable any one having a love for them, to have at least a few tubs containing some of them on their grounds or in front of the house. L. W. Goodell of Pansy Park, Dwight, has grown *V. regia* var. *Randi* the past summer without heat; also many of the tender varieties of Nymphæas. C. M. Atkinson, gardener to John L. Gardner, Brookline, has successfully grown them for years, both in the house and in tubs out-doors. At Swan Point Cemetery, Providence, R. I., the superb lily ponds have added materially to the attractions of that skilfully planted and well managed place. The displays in our hall at the fall exhibitions have been the delight of every visitor, and there is no reason why these plants should not be more extensively grown and take the place of things less pleasing and not one-half as interesting. How much better are Mr. Lee's grounds with the charming plants which we have tried to tell you about, than they would be if planted, in the too frequent way, with ordinary bedding plants! It is a cause for profound congratulation to find a gentleman who is so deeply interested for others, and has made the grounds surrounding his factory so pleasing to the operatives. It is a step forward in the grand march of a higher cultivation, and as the beauties of the garden are admired and enjoyed by these people, and by other visitors, to whom the grounds are never closed, their grateful hearts will respond with blessings upon the generous benefactor.

Redgate, Marblehead Neck,—The Summer Residence of Charles W. Parker.

The Committee were invited to these beautiful grounds, and visited them September 23. It is not often that we have been afforded the pleasure and profit that this visit gave us. There are but few who do not know of this noted summer resort. Of all the dreary and unattractive places in which to make a desirable summer home probably none could have been found more unpromising. For many years we knew it as described, having frequently visited it while living near by. But not having seen it since the summer of 1885, until this season, we could hardly realize that this was the same place that but a few years ago was only a barren waste.

Here truly, the desert has been made to bud and blossom, and the charm of it all is that Mr. Parker has done it himself. Had he chosen a landscape gardener to lay out and improve the grounds, no matter how skilfully the work might have been done, the pleasure of designing and making the changes would have been lost to him. Truly Nature has been improved and not desecrated. The location of a summer residence is, when possible, chosen for its commanding views; in this Mr. Parker was fortunate, having located on a very commanding spot near the water's edge. It is not the highest part of his estate by any means, but the best, as it is where every room in the house commands a beautiful view, either inland, or water and inland combined, the freedom of which is in no way obstructed. Perhaps the most charming outlook is that from the octagon piazza, which is connected with the long one running the full length of the water-front of the house. The views from this point are truly fascinating. Standing there and simply turning around, one commands a panoramic view which includes a beautiful vista of inland scenery — the harbor, Nahant, the lighthouse on Egg Rock, Lynn Beach, Swampscott, Marblehead, and then the delightful view over the Neck to the ocean,— nowhere else that we know of can more charming variety of scenery be viewed from one spot than this. Particularly noticeable was the neat simplicity of the entire grounds, which forms their peculiar charm. We were also pleased to notice that the too frequent mistake — especially of amateur direction — that of over planting — had not invaded these grounds. Mr. Parker at first closely observed and studied what was naturally growing on the grounds and arranged his plans accordingly. To illustrate: there was a spot found where a gooseberry bush was growing, a native of the place; the thought occurred to Mr. Parker that this was the place for a small-fruit garden. It was accordingly devoted to that purpose, and with very gratifying results. In another place is a magnificent bed of Foxgloves and Hollyhocks, with a large natural ledge for a background, the effect of which is very pleasing. The planting of trees and shrubs is largely between the natural ledges, not a particle of which has been removed; boulders only have been cleared away. The vegetable garden is in one corner of the grounds, arranged in squares with sod edges and gravel walks, and all in perfect order. Not the least interesting event of this day, was a visit to the studio of Mr. Parker's son, located in a

quiet corner, where a short time was spent in looking at the productions of the artist's pencil.

With these few introductory remarks, your attention is invited to Mr. Parker's statement, which will be of more interest than any further remarks from the Committee.

Statement of Charles W. Parker.

My place at Marblehead Neck is about seven acres in extent, including about one-half acre of salt marsh. When I bought it the land was in a most unattractive condition — full of loose stones, rough, and apparently very sterile — a good deal of the area being occupied by large ledges rising above the general level of the ground, in some places six or eight feet in height. There were no trees excepting a few small, scrubby, red cedars growing about the ledges. The land had been in the market for some time, but remained unsold after all the rest of the harbor frontage had been taken up, which showed that this was considered the least desirable.

I had been spending my summers for several years in Marblehead town, directly across the harbor from this place, and thinking that I would like to remove to the Neck, I concluded to buy this land and see what I could make of it.

I began about nine years ago, by breaking it up and clearing it of loose stones, using the plough where it was possible, although much of the work had to be done with the pick and breaking up hoe.

To get the stones out of the way I built a wall on the road frontage about 1,200 feet in length; this, I think, will prove to be an enduring and economical fence. The first year I planted potatoes and got a good crop. I would say that a reference to my memoranda shows that I bought a good deal of manure, and I have continued to do so ever since, the result being that whatever I have tried to raise has done well.

A level plot of about half an acre at the foot of a declivity, with a southern exposure, serves as a vegetable garden. In this place we raise all the kinds of vegetables we can think of, that we want for our own use, such as asparagus, beans of the various kinds, peas, radishes, beets, carrots, turnips, onions, leeks, Brussels sprouts, Scotch kale, Swiss chard, French sorrel, cucumbers,

English dock, chives, tomatoes, etc., and of herbs, tarragon, thyme, spearmint, peppermint, catnip, wormwood, and caraway. I raise potatoes, corn, and squashes in another place.

A small patch, about twenty-five feet square, near the house, in a kind of pocket near the top of one of the ledges is planted with currants and gooseberries, which have done wonderfully well every year. Of currants, we gathered about two bushels this year on this spot from about a dozen bushes.

Raspberries are planted in another place similar to that used for currants. Of these we have also an abundance.

Strawberries are grown on a strip of land about ten feet wide, and fifty feet long, between two ledges, and have always produced a satisfactory crop of fine fruit.

In 1884 and 1885, I planted trees and shrubs all about the place. As the situation is very much exposed to high winds, especially in the winter, a good many of these died, but enough lived and most of them are thriving.

Norway maples and Sycamore maples especially have done well. A row of Lombardy poplars planted by the road in a moist place in 1884, have grown to the height of at least fifty feet and a diameter of from six to eight inches; of several varieties of oaks planted none have done well.

Regarding flowers, all kinds have flourished. A specially attractive feature every summer is a row of hollyhocks planted along the base of a ledge rising from the edge of a lawn. The row is about seventy-five feet long, and runs on a slight curve. The ledge forms a background for the plants and flowers.

Roses are planted mostly in crevices or pockets between the rocks and thrive wonderfully, some being within twenty-five yards of the salt water.

We grow nearly all our flowers either alongside of or between, the rocks, and avoid as much as possible all appearance of set beds. This summer we have had some very good tuberous-rooted begonias, and French cannas. I am endeavoring to get in a collection of wild flowers, especially the golden rods and asters, which have been so beautiful this year.

Of the cultivated flowers, we raise mostly the common, old-fashioned kinds — nasturtiums, morning glories, pansies, poppies, phloxes, asters, portulacas, etc.

I would say that in the development of this place I have never had the services of a professional gardener. It has been my summer amusement and recreation to study the place, and think out for myself the most effective methods, according to my taste and that of my family, and I have been most fortunate in having the services of a man to take charge of the work who is as much interested in the place as I am. I employed him for half a day some ten years ago to dig a trench for a water pipe, and he did that simple piece of work so faithfully that I engaged him permanently, and he has worked for me during eight months of each year ever since, having become, in the meantime, an excellent gardener.

Yours very truly,

CHARLES W. PARKER.

In closing this report, we trust that our efforts may be found worthy of your approval; we again ask the coöperation of all the members of the Society and whatever any of you may have that is worthy of note, from the humble door-yard of the cottager, to the large and elaborate estate, we trust you will give us the opportunity to record its beauties among our notes. The aim of this Committee, is the advancement of Horticulture, which is a field for learning. Washington said: "Agriculture is the most noble, the most healthful, and the most useful employment of man," and who can deny that Horticulture is akin to it? Our Society has a reputation for usefulness and influence second to none in existence; this standard must not only be maintained but we must be progressive. Shall we have your coöperation? With it, the march onward and upward will be easy; without it, not only difficult and discouraging, but discreditable. We invite your careful attention to the revised list of prizes for the ensuing year, and trust that we shall have a spirited competition for them all.

The following awards have been made:

For the best house of Forced Vegetables, to Varnum Frost, Arlington	$50 00
For the best arranged and best kept Stove or Greenhouse, the First Prize to David Monteith, gardener to George A. Nickerson, Dedham	50 00
Second, to Kenneth Finlayson, gardener to Dr. C. G. Weld, Brookline	30 00

For the best amateur Garden, to Charles W. Parker, Marblehead Neck $40 00

Gratuities:—

To Charles V. Whitten, Dorchester, for a fine house of Ulrich Brunner Roses, March 19, 1892 . . . 30 00

To Francis B. Hayes, Lexington, for a fine display of Hardy and Tender Rhododendrons, under a tent, June, 13, 1892 . . . . . 30 00

To Fisher Brothers & Co., Montvale, for a well managed Florist's establishment, August 25, 1892 . . . 30 00

To W. W. Lee, Northampton, for the successful cultivation of Aquatic Plants, September 2, 1892 . . 30 00

All of which is respectfully submitted,

JOHN G. BARKER,
ARTHUR H. FEWKES,
E. W. WOOD,
C. N. BRACKETT,
JACKSON DAWSON,
HENRY W. WILSON,
F. L. HARRIS,
Committee on Gardens.

[The plates from which the views in Mr. Lee's grounds were printed, were furnished by the Chairman of the Garden Committee.]

REPORT

OF THE

COMMITTEE OF ARRANGEMENTS,

FOR THE YEAR 1892.

By JOSEPH H. WOODFORD, CHAIRMAN.

At the end of our business year it becomes necessary to take an account of our transactions, to review the work we have accomplished during the past year, and to make resolutions to excel all our previous endeavors for the good of our Society, in the year about to commence.

The exhibitions throughout the year have been quite full and very satisfactory. The arrangements of the tables and spaces for the exhibits have constantly been varied, so that no monotony has occurred, and each exhibition has been so managed that no one was in its arrangement a duplicate of any other. This gave a pleasing and symmetrical effect to our halls, and could be carried out only after a careful study of the Society's Schedule of Prizes.

The newspapers have been very liberal in the copious and flattering notices of our exhibitions, and we are under great and lasting obligations to the able reporters who have written so well their impressions of the results of our endeavors.

The different Committees in their reports will tell of the progress our Society is making in the various branches of our calling, and we have no doubt that these reports will be read with pleasure and instruction by those in search of the knowledge they afford.

I take from the Treasurer's book a list of the receipts and expenses attending the Exhibitions held during the past year, as follows:

Receipts:		
Spring Exhibition	$608 25	
Rhododendron Show	145 75	
Annual Exhibition of Plants and Flowers	285 50	
Annual Exhibition of Fruits and Vegetables	70 50	
Chrysanthemum Show	1,035 75	
Total receipts		$2,145 75
Expenses:		
Spring Exhibition	$293 42	
Rhododendron Show	126 56	
Rose Show	16 00	
Annual Exhibition of Plants and Flowers	235 30	
Annual Exhibition of Fruits and Vegetables	94 30	
Chrysanthemum Show	207 18	
Total expenses		$972 76.
Showing a balance of		$1,172 99

which has gone into the treasury of the Society.

All of which is respectfully submitted.

For the Committee,

JOSEPH H. WOODFORD,
Chairman.

REPORT

OF THE

COMMITTEE ON WINDOW GARDENING,

FOR THE YEAR 1892.

By HENRIETTA L. T. WOLCOTT, Chairman.

By reference to the report submitted in the year 1888, by the Committee on Window Gardening, it will be seen that there were difficulties to be met in reporting on the growth of an idea. These or equally serious difficulties have been with us always, like our poor brethren. But in looking back over the years of such labors as the subject has placed upon the Committee, great progress can be witnessed.

Strange as it may seem, it has always been difficult to secure enthusiastic helpers. Where there can be no pecuniary gain, a double portion of true enthusiasm is needed to carry any work forward. Neither pride in the Society's aims, nor a true love for flowers, nor signs of Nature's methods developed for the delight or sustenance of man, nor a loyal desire that the homes of the humblest citizens should have an uplifting, seemed to stir the hearts or minds of members — at least to any great extent.

Busy men everywhere — busy women also; but should we pause a moment at the threshold of a new year and ask ourselves the simple question, for what do we strive? for what do we once a week exhibit our plants, or our cut flowers, both of which give evidence of care and thought? would not the answer be "*for self*, for business reputation, or for pecuniary gain, or possibly all"? The aims of your Committee have been in a different line. They had hoped to develop another avenue of true enjoyment, by opening the eyes of children to the beautiful which lies all about us, usually unseen. The only visible pecuniary gain has been seen

on Easter Sundays, when the displays of pot plants in the churches has hinted at great sales, and greater or less profit to the florist.

Early in the season the Committee decided to bend their energies towards interesting school children not residing near Boston in collecting plants for herbariums. The insurmountable obstacles in the way of giving prizes to raisers of small plants had been carefully considered. They were, of course, distributed only to such children as lived in the immediate vicinity of the city of Boston. At the suggestion of a member, one county was "to be especially canvassed." As soon as the circulars were prepared, as no one of the Committee could serve as Secretary, it became necessary for the Chairman, with the coöperation of the member from Plymouth County, to open correspondence with the principals of schools, with the members of school committees, and with the superintendents of schools, if any were employed. Mr. Hersey agreed to take care of Hingham. Explanatory letters were mailed to all such officials. The responses were quite general. Circulars were mailed anywhere and everywhere when requested.

During the early summer, before the time for closing the schools, much instruction was given to the children, and their interest in the subject was excited. In several schools the children arranged pretty gardens, bringing from the woods and lowlands such plants as gave promise of beauty.

This work was always done out of school hours. Of course much depended on the sympathy expressed by the teacher. When the teacher lived at a distance which necessitated leaving her pupils the moment the school session closed and reaching the building only in season to attend to the opening exercises, it was difficult for the children to work wisely.

But they worked with a will, and until vacation the blooming of the different plants was a constant delight. But with the long vacation, with long, hot, dusty days, the plants faded; no water could be taken to them, save by children who lived within a mile of the school-house. Good-natured lads helped the equally good and happy lassies to carry water for a time. But when the berry season came, and money for shoes was to be earned, the water supply failed.

The educational value to the boys and girls—disappointing as it was to the enthusiastic pupil—was worth much more than the trim

conventional shows of gaudy leaved plants furnished by the city. Each plant carried its personal interest, and when by circumstances not to be controlled the blossoms failed, or were not fine, the buoyancy of the youthful mind planned another trial. A memorandum of the "wants" of a country school, which lies on my desk, will prevent my forgetting my promise to "see to it, in season."

Before this herbarium plan was thoroughly developed, your Committee were cordially invited to attend the exhibition at the Girls' High School in Boston, where the multitude of specimen plants was bewildering. Blossoming plants, annuals, vines, and vegetables were there. It was very interesting to see the care which had been taken to record the details, of the time of planting seeds, and the date of visible germination, with the size, formation, and duration of the cotyledons. For several years your Committee had supplied seeds, seedlings, and some plants, to the graduating class, hoping, by thus supplementing the instruction in Botany furnished by the city of Boston, to carry out the aims of the founders of our Society.

In early winter we suggested that seeds of such plants as seemed to be easily managed by experts, and occasionally by others, should be planted. At the exhibition the small plants of Geranium, Fuchsia, and others thus produced, were an attractive addition; and the enthusiasm of the pupils was quite as attractive.

At Easter your Committee were notified of the meeting in the Sailors' Bethel, Hanover Street, at which the Chairman and Mr. M. B. Faxon were asked to "talk" in behalf of the Society and its efforts to help in beautifying homes.

It was suggested, after the plants were distributed to the Sunday School children, that it would be pleasant to know whether *any child* cared enough for its present to watch its growth more than one year. About fifty rose in response to the question, How many have their two years old plants in good order? thirty had three years old plants, and after the close of the meeting a young man came to me to say that his two geraniums, five years old, were still fine thriving plants, and were the delight of his home. He was one of the larger boys in the class at the time of the distribution.

A very bright woman once replied to the question: "Will you serve on such and such a Committee?" "Yes, gladly, but let the

Committee consist of three women; let one be a confirmed invalid, and let another go to Europe for the year. Then the responsibility will rest on some *one* alone." Your Chairman has often wondered who the one could be, who should carry on the burden of our Committee, for the year just passed.

The retiring of the Secretary left us helpless. No one could or would serve in that capacity. In February your Chairman, in the most reprehensible manner, succumbed to acute rheumatism; and the correspondence, which is always burdensome to able hands, was often delayed or omitted altogether. However, knowing that the watchful community has little sympathy with those who labor in quiet, without pictures of their members to raise enthusiasm, the acknowledging of official letters from State societies was attended to.

The final exhibition of the work of the children spoke for itself. Possibly there were no crowds to examine the collection; but many earnest friends of this branch of child culture, were present, and their interest in it was well rewarded by the evident advantages the children had derived from the work of preparing their exhibits.

In closing the Report for the year 1892, your Chairman desires to make a humble apology to those children whose plants did not receive a prize at some of the many displays which have been examined by the Committee on Window Gardening during the past five years. There has always been a legend accepted by the successful raiser, that "it is an easy matter *to raise a plant*, say a geranium, a fuchsia, a monthly rose, a heliotrope, or some such simple flower." Noticing some serious failures on greenhouse shelves, some very shabby plants for sale in the spring, in the markets and on the corners of the streets; noticing also the terrible result of the forcing process, specially used at Easter, I was led to wonder — excuse my personal reference — if the children had been fairly treated.

Desiring to aid the Director of the Botanical Section of the Agricultural Department at Washington, I asked for space in the greenhouses of George A. Parker, a member of this Society, and of the Committee. In March I commenced work. Every facility was afforded me, but no watching could always prevent mice from using up my precious seedlings for their dessert; no human oversight or forethought could prevent a jet of water, unexpectedly

thrown from the hose, from deluging one plant while overlooking another, when twenty thousand were to be watered. A sudden gust of wind, a drop of the mercury, also unexpected, would chill a heliotrope just promising bloom, or a salvia by the window which a fanatic opened to allow cool air to sweep through the room where the child's treasure was kept.

In the six months of steady work, I experienced many failures to carry my plants to flowering condition, while I scored many more successes among the many thousand species. Still my heart thrills with sympathy as I recall the sad faces of the disappointed exhibitors, and hereafter the Chairman will try to be more considerate, having realized some of the difficulties.

The following prizes and gratuities were awarded to children who exhibited herbariums in Horticultural Hall, December 9 and 10, 1892:

FERNS.—First prize for thirty specimens, Gilman H. Hitchings,	$4 00
First prize for twenty specimens, Arthur C. Faxon,	3 00
FLOWERS.—First prize for seventy-five specimens, Bessie Spencer,	3 00
First prize for twenty-five specimens, Mary C. Murphy,	1 50
Second prize, Bessie Young,	1 00
LEAVES.—First prize, for thirteen sheets, C. Evelyn Crofoot,	2 00
Second prize, for twenty sheets, Bertha Jones,	1 00
Third prize, for twelve sheets, Ethel M. Sargent,	75
Amount of Awards in Prizes,	$16 25

Gratuities:—

For one hundred and ninety specimens of Flowering Plants, John Rockett,	$4 00
For one hundred and sixty-five specimens of Flowering Plants, Gertrude Clark,	3 00
For one hundred and eight specimens of Flowering Plants, Lila Ufford,	2 00
Amount of Gratuities,	$9 00
Total Awards,	$25 25

Gratuities were awarded because the children who received them did not comply with the requisitions of the Committee, as regards size of paper, labelling, and number. The paper was about seven by ten inches; the largest collection was labelled half in one handwriting and half in another; and many plants in the smallest were unnamed, and some were cultivated.

We append, from Mr. Clapp of this Committee, whose enthusiasm in its work has never been dominated by any interest save the loyal one, the good of the child, a second report on the School Garden connected with the George Putnam School, of which he is principal.

For the Committee,

HENRIETTA L. T. WOLCOTT,
Chairman.

REPORT ON THE GEORGE PUTNAM SCHOOL GARDEN, SEASON OF 1892.

In the autumn of 1891 the gladiolus bulbs, canna and dahlia tubers, and geraniums were placed in the cellar of the school building and planted out in the spring of 1892. To the general stock of perennial plants cultivated during the season of 1891, important additions were made, including large clumps of yellow iris, blue iris, a dozen rose bushes and a dozen clumps of large, pink-flowered, hardy chrysanthemums, which at the present writing, October 21, are flowering profusely, and supplying every school room with flowers. The new additions of dahlias and gladioli have also flowered profusely in spite of the poverty of the soil, which is thin and clayey. Such profuse flowering in extremely poor soil suggests the thought that a good deal about plant food remains to be found out. Very commonly in rich soil chrysanthemum plants lose their leaves on the lower part of the stalks; but those in the school garden are leafy-green to the ground.

The display of sixteen varieties of native asters has been remarkable in the size of the clumps and the number of flowers, especially of *A. diffusus*, *A. multiflorus*, *A. linariifolius*, *A. cordifolius*, and *A. undulatus*. Photographs of the most striking clumps have been taken.

This fall nine varieties of Golden Rod have been set out in the garden. Among these are:

Solidago bicolor.
S. cæsia.
S. lanceolata.
S. nemoralis.
S. odora.
S. rugosa.
S. serotina.

Other plants introduced since last spring are:

Bellwort.
Bush Clover.
Bushy Aster.
Early Meadow Rue.
False Mitrewort.
Hog Peanut.
Orange-grass.
Pale Corydalis.
Partridge Berry.
Pennyroyal.

Red Trillium.	Flowering Fern.
Round-leaved Pyrola.	Sensitive Fern.
Tick-Trefoil.	Princė's Pine.
Common Polypody.	

Each member of the first class has been given a plant to take care of. He ties up his plant, takes off all dead leaves and extraneous branches, and digs around and waters it. Then he sketches its characteristic parts,— flower, leaf, stem, and any peculiarity, and takes such written notes as will enable him to write an account of the plant and illustrate it with drawings. On one occasion each of the thirty-two members of the class studied his own clump of asters, there being just enough clumps to go around.

The pupils of the second class have each drawn and described four or five varieties of asters. In this way they learn to know plants, while they are cultivating their powers of observation, comparison, and judgment. The importance of seeing and studying plants growing in large masses can hardly be over-estimated, if interest and thoroughness in learning them is desired. In consequence of the school work on asters, more than one hundred and twenty-five fine specimens of a dozen varieties were displayed at the exhibition of herbariums, December 9 and 10, 1892. At the Annual Exhibition of Fruits and Vegetables, October 4, 5, and 6, twenty varieties of wild asters and golden rods from the garden were exhibited.

About one-quarter of the land, at the rear of the school yard, available for a school garden is now under cultivation, and in view of the many plants now occupying the ground, the possibilities of the uncultivated portion may be imagined.

The only necessary expenses connected with it are those of fertilizing the naturally thin and clayey soil and caring for the plants during the long and usually dry vacation season, the most critical period of the year. The slight expense of the latter, which was defrayed by the Window Gardening Committee, has proved a good investment, certainly helping to put into the schools — what should go into the life of the nation — some knowledge of horticulture and a love of Nature.

HENRY L. CLAPP,
Principal of George Putnam School.

REPORT

TO THE

STATE BOARD OF AGRICULTURE,

FOR THE YEAR 1892.

By GEORGE CRUICKSHANKS, of Fitchburg.

The Massachusetts Horticultural Society has just closed the sixty-fourth year of its existence. The influence exerted by this Society is felt wherever the Science of Horticulture is known and practised. Its Library today is one of the foremost in the world. Its collection of purely horticultural works is by far the finest in existence; its beginning was a donation of books by one of the founders of the Society. Now it contains nearly seven thousand volumes and as many pamphlets. Many of these books are very rare and costly. One splendid work in ten large volumes contains nearly one thousand figures of the plants of the Grecian Peninsula and Islands in their natural size and color. Another very extensive work consists of eighteen large volumes, containing three thousand two hundred and forty colored plates of plants which grow in Denmark, Norway, and Sweden. The first volume of this work appeared in 1761, and it was not completed till 1883 — one hundred and twenty-two years from the beginning. Besides the works named are a large number devoted to a single class of plants, such as grasses, with hundreds of colored plates. Another class of books describes the flora of almost every country in the world, and there are also works on the Palms, Ferns, and Orchids of the tropics. There are many works in this library which if lost could not be replaced.

The Society appropriated $7,550 in prizes to carry on its work during the year 1892.

The year began with a course of lectures and discussions as follows:

January 9. The System of Irrigation in the Nile Valley, by Hon. John E. Russell, of Leicester.

January 16. The New Orcharding, by Dr. Thomas H. Hoskins, Newport, Vt.

January 23. Late Experience in dealing with Insects Injurious to Fruit, by Charles V. Riley, Washington, D. C.

January 30. Irrigation with Fresh Sewage, by Henry J. Barnes, M. D., Boston.

February 6. Road Making and Maintenance, by Henry Irwin, B. A., C. E., Montreal, Canada.

February 13. Fungous Diseases on Plants and their Remedies, by Prof. James Ellis Humphrey, S. B., Amherst.

February 20. A Talk about the Preserving of Fruits, by Miss Maria Parloa, Boston.

February 27. Arbor Day in Schools, by B. G. Northrop, LL.D., Clinton, Conn.

March 5, Some Consideration of the Effects of Heat, by Col. Henry W. Wilson, Boston.

March 12. The Library of the Massachusetts Horticultural Society, by William E. Endicott, Canton.

March. 19. The Ethics of Flowers, by Mrs. Fannie A. Deane, Edgartown.

March 26. The Relation of the United States Weather Bureau to Agriculture, by J. W. Smith, of the Bureau, Boston.

The Spring Exhibition opened on the 22d of March and continued four days. Few of those who enjoy the beauty and fragrance of the choice productions of the florist are aware of the care and watchfulness necessary to bring these fine specimens of the floral kingdom to so high a state of perfection. The spring flowering bulbs fill a large place. The Hyacinths, Tulips, Jonquils, Polyanthuses, Liliums, Ixias, and Freesias were all well grown and in fine flower. There was a magnificent collection of Cyclamens, the feathery *Acacia pubescens*, Cinerarias, Genistas, and Azaleas, and a rare specimen of the Cocorita Palm in bloom. On the centre table running the length of the hall, was a large and beautiful display of Roses and Carnations. Of Orchids the show was

greater, both in number and variety, than at any previous exhibition.

The Rhododendron Show was held June 10 and 11. The upper hall was devoted to the cut flowers, nine long tables being filled with hundreds of trusses, in all the colors of this favorite flower, of both the hardy and tender varieties, which made a picture of great beauty as seen from the galleries. Four of the nine tables were filled by one exhibitor with Rhododendrons, Hardy Azaleas, and other choice flowers. In the lower hall there was a good show of Pelargoniums, Tuberous Begonias, Gloxinias, and Hardy Herbaceous plants, and an excellent display of early vegetables — Lettuce, Cauliflowers, Tomatoes, Radishes, Carrots, Asparagus, and Cucumbers.

The Annual Exhibition of Plants and Flowers opened September 6, and continued four days. In the upper hall was a brilliant display of greenhouse plants,—stately Palms, Cycads, Ferns, Lycopods, and other tropical plants. Large tanks filled with Water Lilies made a fine show and were very much admired. There was a very interesting show of native plants and wild flowers. In the lower hall was a fine collection of Crotons, Dracænas, and other foliage plants and a fine show of Cannas, Zinnias, Asters, and Dianthuses.

The Annual Exhibition of Fruits and Vegetables began on the 4th of October, continuing three days, with the largest and finest display of fruit ever placed on the tables of the Society. Apples and Pears were all well grown and finely colored; Quinces were very large and fine. Among Peaches, Crawford's Early and Crawford's Late, grown under glass, were very attractive. An interesting contribution was a Pineapple plant with two half-grown fruits. The Massachusetts Agricultural College exhibited, besides other fruits, a collection of sixty varieties of Native Grapes. The lower hall was devoted to vegetables. The show of Tomatoes was the largest and finest ever made so late in the season, there being over sixty dishes. All the vegetables were well grown.

The Chrysanthemum Show opened November 8th, continuing four days. The Chrysanthemum is in some respects a most remarkable flower. In it more than in any other flower are the wonderful possibilities of cultivation illustrated, as may be seen on the tables of this Society. For many centuries it has been the

imperial emblem of Japan. Much is due this Society for the encouragement that it has given for the improvement of the Chrysanthemum. The first Chrysanthemum exhibited in this country was at the Massachusetts Horticultural Society's exhibition, November 26, 1830. An Ex-President of this Society raised the first Chrysanthemum from seed in America. Others have been eminently successful in this particular field of operation and many of the seedlings sent out each year surpass those of earlier introduction. With the exception of a few vases of choice Tea Roses and Carnations the entire space in the Lower Hall was filled with cut flowers of the Chrysanthemum, which for large size, fine form, and pure color compared favorably with any previous exhibition. A large number of choice seedlings were shown for the first time. The chief attraction centred in the Upper Hall. We found at the entrance a few trained standards nearly ten feet high. Many of the pot plants were six feet across and not more than four feet high, with two hundred perfect flowers. All the plants had perfect foliage. The view from the galleries was dazzling with the brilliant hues of the Autumn Queen.

GEORGE CRUICKSHANKS,

Delegate.

REPORT

OF THE

Committee on Large, Old, or Otherwise Interesting Trees

IN NEW ENGLAND.

At a meeting of the Society held January 7th, 1882, a Committee, consisting of Rev. Artemas B. Muzzey, D. D., Edmund Hersey and E. H. Hitchings, was appointed to collect information relating to Large, Old, or Otherwise Interesting Trees in New England. Mr. Muzzey resigned, and on the 21st of the same month Hon. Marshall P. Wilder was appointed to fill his place. Mr. Wilder acted as Chairman until his death, improving every opportunity to gather important and interesting facts relating to a large number of trees worthy of notice. Since Mr. Wilder's death the Committee has been enlarged and the work of collecting information has been continued.

In March, 1890, the Committee, believing that they had gathered information relating to most of the important trees in New England, but wishing to cover the whole territory by systematic effort, so that no tree worthy of notice should be overlooked, asked of the Society authority to send out circulars to every town in New England, soliciting information relating to any tree of importance enough to have its history preserved. The cost of the circulars, the postage on them, and the postal cards to be returned was paid by the Society, but the labor of looking up addresses and directing the circulars was furnished by Hon. James J. H. Gregory, who also devoted much time to arranging and classifying the large number of trees of which records had been obtained. By using large sheets of paper each tree has on the same line its age, height, and girt, so far as known; also its

location and the name of the person who sent in the information; or reference is made to the number of the package where the information may be found. With a list thus prepared, it is easy to look up the record of any tree so far as it has been gathered by the Committee.

Early in the present year the Committee, realizing the desirability of securing photographs of as many of the most important trees as possible, without incurring much expense, asked of the Society authority to send out to amateur photographers circulars containing a list of the prominent trees of which we had records, requesting those who should take photographs of any of the trees to send to the Society copies of the same. This circular was prepared by the Society and although it has been freely circulated by the Committee the number of photographs sent in has not been as large as the Committee had reason to expect, but no doubt more will yet be sent in. Forty-two photographs have been collected. Full or partial records of 340 trees have been collected, as follows: Elm, 101; Oak, 51; Pine, 18; Ash, 15; Maple, 15; Chestnut, 14; Linden, 13; Buttonwood, 12; Apple, 11; Walnut, 11; Willow, 9; Birch, 8; Beech, 8; Sassafras, 6; Hemlock, 6; Cedar 5; Balm of Gilead, 5; Nettletree, 4; Butternut, Cherry, Hop Hornbeam, Larch, and Pear, 3 each; Cypress, Locust, and Poplar, 2 each; Acacia, Buckthorn, Cucumber, Hackberry, Spruce, and Tupelo, 1 each.

While a condensed history of some of the most noted trees has been secured, there are many important ones of which we have been able to obtain only a very brief history if any. This is to be regretted, for if the Society ever decides to publish a book containing a list and photographs of the trees, it would be very desirable to have a brief record accompany each tree noticed. The longer this work is delayed the more difficult it will be to gather desirable facts relating to any of the very old trees.

While the Committee have in a general way urged the importance of having a brief history of each tree, they have not found time to take up the work in a systematic manner; to do this would necessitate a thorough examination of the records already sent in. These should be copied and properly arranged so that when others are secured they can be added to them, and the information thus kept in a form to be easily referred to when occasion may require.

If this work is ever to be done it would seem that the sooner it is commenced the easier it will be to accomplish it. By systematic effort, no doubt brief histories could be obtained of most if not all of the important trees of which we have a list. The cost of employing a competent person to do this work, including postage, would not exceed one hundred and fifty dollars.

When these histories are collected and arranged the Committee recommend that a competent photographer be employed to take pictures of the most remarkable or interesting of these trees.

For the Committee,

EDMUND HERSEY, *Chairman.*

December 3, 1892.

REPORT

OF THE

COMMITTEE ON THE LIBRARY,

FOR THE YEAR 1892.

The list of books acquired this year will be found to contain many more than the average number of titles, though there are fewer works of remarkable costliness or extent than usual; still the volumes of Professor Sargent's "Silva of North America" and the parts of the Marquess of Lothian's "Genus Masdevallia" received this year are worthy companions, in importance and interest, of any acquisitions of preceding years.

A great many sets of periodical publications, some of them very extensive and valuable, have been acquired and also an unusual number of trade catalogues, the value of which as materials for the history of horticulture is well illustrated by the list issued by Henry Groom of London in 1835, from which we learn that even at that late date many varieties of tulips were priced at ten or fifteen pounds sterling per bulb; two or three at twenty or thirty pounds, and one, Groom's King William IV, at no less than fifty pounds.

All the money available for the uses of the Library has been expended in the usual ways except the sum appropriated for the Card Catalogue of plates. The writer of the cards has been prevented from working at her task during the greater part of the year by circumstances not necessary to relate here, but we have every reason to hope that next year the work will proceed as rapidly and satisfactorily as heretofore.

The fact was mentioned in last year's report that we had filled all of our front shelf-space, and had been obliged to pack some books behind others. Of course the number of books thus put out of sight is much greater now than then. The time will soon arrive when we shall feel compelled to ask the Society to extend the present gallery around the upper part of the librarian's room.

For the Committee on the Library,

W. E. ENDICOTT, *Chairman.*

LIBRARY ACCESSIONS.

The measurements of the books in the following lists are in inches and tenths of an inch, giving first the height, next the thickness, and lastly the width. When a pamphlet possesses no measurable thickness the place of that dimension is supplied by a dash.

Books Purchased.

HORTICULTURE.

Hamburger Garten- und Blumenzeitung. Zeitschrift für Garten- und Blumenfreunde, Kunst- und Handelsgärtner. 1845–1890. Vols. 1–46. Half red morocco, 8.9×1.3–1.5×5.8. Hamburg: 1845,'46–1890.

Wiener Illustrirte Garten-zeitung. Organ der k. k. Gartenbau-Gesellschaft in Wien. Redigirt von Dr. Günther Ritter Beck von Mannagetta, und Fr. Abel. Vols. 1–14. 1876–1889 (inclusive). Half green morocco, 9.6×1.2×6.9, colored plates (beginning in Vol. 14), and cuts. Wien: 1876–1889.

Lyon Horticole. Revue bi-mensuelle d'horticulture. 1879–1891 (inclusive). Vols. 1 to 13. Half maroon morocco, 10.5×.9×7., cuts. Lyon: 1879–1891.

Marnock, Robert, *Editor*. The Floricultural Magazine and Miscellany of Gardening. 6 vols. Faded green cloth, 9.1×.9×5.8, 72 colored plates. London: 1836–1842.

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The Garden.
Gardening Illustrated.
Horticultural Times and Covent Garden Gazette.
Curtis's Botanical Magazine.
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FRENCH. — Revue Horticole.
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Botanical Gazette.
Pittonia.
West American Scientist.
Maine Farmer.
New England Farmer.
Massachusetts Ploughman.
American Cultivator.
New England Homestead.
Our Country Home.
American Agriculturist.
Rural New-Yorker.
Metropolitan and Rural Home.
Farm Journal.
National Stockman and Farmer.
Farm and Vineyard.
Germantown Telegraph.

Maryland Farmer.
Florida Dispatch, Farmer and Fruit Grower.
Prairie Farmer.
Orange Judd Farmer.
The Industrialist.
Pacific Rural Press.
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Good Roads.
Cottage Hearth.
Boston Daily Advertiser.
Boston Morning Journal.
Boston Post.
Boston Daily Globe.
Boston Evening Transcript.
Boston Daily Evening Traveller.
Boston Commonwealth.
Boston Times.
New York Weekly World.
Jeffersonian Republican.

REPORT

OF THE

SECRETARY AND LIBRARIAN,

FOR THE YEAR 1892.

The TRANSACTIONS of the Society, Part I for 1892, and Part II for 1891, having been sent by mail to every member of the Society, it is hardly necessary to say that the arrears in this department have been brought up. Nevertheless, I may be permitted to express my satisfaction that I can make this report, and to say that but for the failure to return promptly papers read at the meetings for discussion, by writers who had taken them home for revision, and other circumstances entirely beyond my control, the TRANSACTIONS would have been completed at least two months earlier than they were.

Owing to the worn condition of the copperplate of our diplomas, none had been given to members, as provided in the Constitution and By-Laws, for some years, but heliotype copies have been made within the year now closing, one of which has been sent to every member, including Honorary and Corresponding, who had not already received one, the number being about three hundred and fifty. Work in other directions which had fallen in arrears, owing to the necessity of devoting as much time as possible to the publications, has also been brought up, and still other remains to be brought up, which will be done as speedily as possible.

The Card Catalogue of the books in the Library has been completed as far as writing the cards is concerned, but these must be verified and arranged before the Catalogue can be of use in finding books. A part of this has been done, but much the greater part remains to be done.

As mentioned in the report of the Library Committee, several valuable sets of horticultural journals and publications of botanical societies have been acquired in the past year. Four of these

sets, comprising 128 volumes, have been placed in the "back row" behind other books, because there was absolutely no other place for them, and soon even this resource will be exhausted.

The work of completing imperfect sets of books has not been lost sight of, but has been steadily pursued, and as a gratifying instance of success I may mention, that the Journal of the Royal Horticultural Society (London) ceased to be added to the Library after the completion of the First Series in 1855. When in 1881 application was made to the Royal Horticultural Society for the five volumes of the Second Series which had then been published, it appeared that the stock in the hands of the Society was exhausted and that the volumes were out of print. The later volumes were, however, received from the Society in exchange for our own publications, and a bookseller in London was requested to procure the others as they might be offered at second hand. Several parts were received in this way and a steady watch was kept here for any that might be offered in book catalogues coming into our hands, and thus several more were acquired from a bookseller in Leipsic. In this way all the numbers have been "picked up," until now our set of the publications of that honored Society is complete, including the quarto Transactions extending back to 1805—ten valuable and costly volumes, with many colored plates —the First Series of the Journal (octavo), from 1846 to 1855, and the Second Series, from 1866 to the present time.

I have before remarked on the accelerated increase of the library. If any evidence of the continuance of this increasingly rapid growth is necessary, it may be found in the fact that the list of Library Accessions preceding this report is of nearly twice the length of the same list in any previous year.

ROBERT MANNING,
Secretary and Librarian.

TREASURER'S REPORT

FOR THE YEAR 1892.

MASSACHUSETTS HORTICULTURAL SOCIETY, *in account current to December 31, 1892, with* CHARLES E. RICHARDSON, *Treasurer.*

1892.	DR.			
Dec. 31.	To amount paid on account of the Library during 1892, viz.:			
	For books, periodicals, and binding .	$282 67		
	From income of Stickney Fund, expended for books	668 74		
				$951 41
	To amount paid for Furniture and Exhibition ware	$1,874 69		
	Less amount received from sale of vases .	10 95		
				1,863 74
	To Interest on Funds for Prizes, credited below	$1,892 72		
	To Interest paid on $10,000 bonds for Sinking Fund	37 50		
				1,930 22
	To Prizes awarded in 1891, paid in 1892, as follows:			
	For Plants	$1,648 37		
	" Flowers	1,549 88		
	" Fruits	1,674 63		
	" Vegetables	946 22		
	" Gardens and Greenhouses . .	325 00		
	" Hunnewell Prizes for Rhododendrons	105 00		
	" Special Prize, Francis Brown Hayes	50 00		
				6,299 10
	To amount paid on Window Garden Committee account, 1891 . .			69 75
	" " Window Garden Committee account, 1892 . .			91 75
	" " Salaries of Secretary and Assistant and Treasurer	$3,300 00		
	" " Salaries of members of Committees	1,043 00		
			4,343 00	
	Amounts carried over, ...		$4,343 00	$11,205 97

Amounts brought over, ...	$4,343 00	$11,205 97
To amount paid on extra services in Library .	825 65	
" " ten $1,000 bonds General Electric Co. for Sinking Fund	10,000 00	
" " account of Committee on Publication and Discussion	242 75	
" paid for Heating	437 08	
" " Labor, including Janitor and Fireman . .	1,821 15	
" " Taxes for 1892 . . .	2,580 00	
" " Insurance . . .	486 00	
" " City Water Rates . .	96 33	
" " Card Catalogue . .	18 00	
" paid on account of Committee of Arrangements . .	300 00	
" paid for Repairs	461 69	
" " Lighting	1,120 25	
" " Incidentals . . .	696 67	
" paid on account of Committee on Old and Interesting Trees	66 65	
" paid for Stationery, Printing, and Postage	2,333 09	
		25,828 26
Total Payments of 1892		$37,034 23
Balance of Cash on hand, December 31, 1892 . .		12,417 19
		$49,451 42

1892.	Cr.		
Jan. 1.	By Balance from account rendered December 31, 1891		$16,125 82
	By Income from Building in 1892:		
	Rent of Stores . .	$17,033 34	
	" Halls . . .	5,415 07	
		$22,448 41	
	By Income from Mount Auburn Cemetery .	5,397 78	
	" Received Massachusetts State Bounty .	600 00	
	" " Annual Exhibitions, gross receipts . .	$2,145 75	
	Less Expenses .	992 76	
		1,152 99	
	" " from Admissions and Assessments	1,192 00	
Amounts carried over, ...		$30,791 18	$16,125 82

Amounts brought over, ...		$30,791 18	$16,125 82
By Interest received on Bonds .	$205 00		
" " " on Deposit in Bank .	326 45		
" " " from all other sources .	25 00		
		556 45	
" Received from sales of History . .		8 50	
" " " " duplicate book of Stickney Fund . .		1 75	
" " " Francis Brown Hayes for Special Prize . .		50 00	
" " " A. K. Loring on account		25 00	
" Interest credited to the following Funds against charges opposite:			
Samuel Appleton Fund, $1,000, at 5%	$50 00		
John A. Lowell Fund, $1,000, at 5%	50 00		
Theodore Lyman Fund, $11,000, at 5%	550 00		
Josiah Bradley Fund, $1,000, at 5%	50 00		
Benjamin V. French Fund, $500, at 5%	25 00		
H. H. Hunnewell Fund, $4,000, at 5%	200 00		
William J. Walker Fund, $2,354.43, at 5% . . .	117 72		
Levi Whitcomb Fund, $500, at 5%	25 00		
Benjamin B. Davis Fund, $500, at 5%	25 00		
Marshall P. Wilder Fund, $1,000, at 5%	50 00		
John Lewis Russell Fund, $1,000, at 5%	50 00		
Josiah Stickney Fund, $12,000, amount	700 00		
		1,892 72	
			$33,325 60
			$49,451 42

CHARLES E. RICHARDSON, *Treasurer.*

BOSTON, December 31, 1892.

Audited and approved,

H. H. HUNNEWELL,
NATHANIEL T. KIDDER,
FREDERICK L. AMES,
} *Finance Committee.*

ASSETS AND LIABILITIES OF THE MASSACHUSETTS HORTICULTURAL SOCIETY,

DECEMBER 31, 1892.

ASSETS.

Real Estate	$250,000 00	
Furniture and Exhibition Ware	6,239 74	
Library	31,597 46	
Stereotype Plates and copies of History	264 50	
Chicago, Burlington & Quincy R. R. Bonds, 7%	1,500 00	
Kansas City, Clinton & Springfield R. R. Bonds, 5%	1,980 00	
General Electric Company's Bonds, 5%	10,000 00	
A. K. Loring	359 41	
Cash	12,417 19	
		$314,358 30

LIABILITIES.

Mortgage		$1,000 00	
Josiah Stickney Fund, payable to Harvard College, 1899		12,000 00	
Prize Funds invested in the Building, viz.:			
Samuel Appleton Fund,	$1,000 00		
John A. Lowell "	1,000 00		
Theodore Lyman "	11,000 00		
Josiah Bradlee "	1,000 00		
Benjamin V. French "	500 00		
H. H. Hunnewell "	2,500 00		
William J. Walker "	2,354 43		
Levi Whitcomb "	500 00		
Benjamin B. Davis "	500 00		
		$20,354 43	
Prize Funds invested in Bonds:			
H. H. Hunnewell Fund	$1,500 00		
Marshall P. Wilder "	1,000 00		
John Lewis Russell "	1,000 00		
		3,500 00	
			23,854 43
Window Garden Committee's unpaid balance of accounts, 1892		158 25	
Prizes for 1892 due and unpaid		7,550 00	
			44,562 68
Surplus			$269,795 62

CHARLES E. RICHARDSON, *Treasurer.*

MEMBERSHIP ACCOUNT, DECEMBER 31, 1892.

Number of Life Members per last report		558	
Added during 1892		14	
Commuted from Annual		5	
			577
Deceased			28
			549
Number of Annual Members per last report		223	
Added during 1892		24	
			247
Commuted to Life Membership		5	
Deceased		5	
Dropped by request		2	
" for non-payment for two years		1	
			13
			234
Present membership			783

INCOME FROM MEMBERSHIP.

14 new Life Members, @ $30	$420 00
5 transferred to Life, @ $20	100 00
24 new Annual Members, @ $10	240 00
Assessments	432 00
	$1,192 00

CHARLES E. RICHARDSON, *Treasurer.*

Dr. *Massachusetts Horticultural Society in account with the Proprietors of the Cemetery of Mt. Auburn.* **Cr.**

For Sales and Improvements within the Cemetery for the year ending December 31, 1892.

To cost of filling up and improving land at Mt. Auburn for the year ending December 31, 1892, the Massachusetts Horticultural Society being charged with their proportion of the same:			By sales in January		$868 00
			" " February		665 00
			" " March (no sales.)		
			" " April		2,547 00
			" " May		5,917 50
			" " June		877 50
			" " July		2,036 40
			" " August		551 00
			" " September		1,180 00
			" " October		4,202 75
			" " November		1,652 00
Glen Avenue	$343 12		" " December		2,266 00
Birch Avenue, to Eagle and Cherry Ave's	127 51				$22,763 15
Spruce to Mound Avenues	71 43		Net amount received from Receiving Tomb		845 00
	$542 06				$23,608 15
One quarter of $542.06 is	$135 51		Less Graves repurchased		75 00
Balance due Mass. Horticultural Society	5,397 78				$23,533 15
		$5,533 29	Deduct for Annual Expenses		1,400 00
					$22,133 15
		$5,533 29	Mass. Horticultural Society ¼ part of $22,133.15 is		$5,533 29

E. & O. E.

H. B. MACKINTOSH, *Treasurer.*

December 31, 1892.

MASSACHUSETTS HORTICULTURAL SOCIETY

To the PROPRIETORS OF THE CEMETERY OF MOUNT AUBURN, *Dr.*

For one-fourth part of the following Expenditures, for grading new lands for sale during the year 1892:

Glen Avenue.		
91½ days, man and horse	$343 12	
		$343 12
Birch to Eagle and Cherry Avenues.		
37½ days, men	$84 38	
11½ days, man and horse	43 13	
		127 51
Spruce to Mound Avenues.		
30½ days, men	$68 62	
¾ day, man and horse	2 81	
		71 43
		$542 06
One-fourth of $542 06 is		$135 51

MOUNT AUBURN, December 31, 1892.

J. W. LOVERING,
Supt. of the Cemetery of Mount Auburn.

I certify the foregoing to be a true copy of improvements for the year 1892, rendered by the Superintendent.

H. B. MACKINTOSH,
Treasurer.

Massachusetts Horticultural Society.

OFFICERS AND STANDING COMMITTEES FOR 1893.

President.

NATHANIEL T. KIDDER, OF MILTON.

Vice-Presidents.

CHARLES H. B. BRECK, OF BRIGHTON. CHARLES S. SARGENT, OF BROOKLINE.
FREDERICK L. AMES, OF NO. EASTON. FRANCIS H. APPLETON, OF PEABODY.

Treasurer and Superintendent of the Building.

CHARLES E. RICHARDSON, OF CAMBRIDGE.

Secretary and Librarian.

ROBERT MANNING, OF SALEM.*

Professor of Botany and Vegetable Physiology.

CHARLES S. SARGENT, OF BROOKLINE.

Professor of Entomology.

SAMUEL H. SCUDDER, OF CAMBRIDGE.

Delegate to the State Board of Agriculture.

E. W. WOOD, OF WEST NEWTON.

Delegate to the Board of Control of the State Agricultural Experiment Station.

WILLIAM C. STRONG, OF WABAN.

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*Communications to the Secretary, on the business of the Society, should be addressed to him at Horticultural Hall, Boston.

Standing Committees.

Executive.

THE PRESIDENT, NATHANIEL T. KIDDER, CHAIRMAN.

THE CHAIRMAN OF THE FINANCE COMMITTEE, H. H. HUNNEWELL, *EX OFFICIO*.

WILLIAM C. STRONG. BENJAMIN C. CLARK.
CHARLES H. B. BRECK. FRANCIS H. APPLETON.
WILLIAM H. SPOONER. WALTER HUNNEWELL.
PATRICK NORTON.

Finance.

H. HOLLIS HUNNEWELL, OF BOSTON, CHAIRMAN.

NATHANIEL T. KIDDER. FREDERICK L. AMES.

Publication and Discussion.

O. B. HADWEN, OF WORCESTER, CHAIRMAN.

J. D. W. FRENCH. C. MINOT WELD.

For Establishing Prizes.

CHAIRMAN OF COMMITTEE ON FRUITS, CHAIRMAN.

CHAIRMEN OF THE COMMITTEES ON PLANTS, FLOWERS, VEGETABLES, AND GARDENS, *EX OFFICIIS*.

CHARLES M. ATKINSON. J. WOODWARD MANNING, JR.

Library.

WILLIAM E. ENDICOTT, OF CANTON, CHAIRMAN.

THE PROFESSOR OF BOTANY AND VEGETABLE PHYSIOLOGY, AND THE PROFESSOR OF ENTOMOLOGY, *EX OFFICIIS*.

J. D. W. FRENCH. EDWIN FAXON.
GEORGE W. HUMPHREY. WILLIAM J. STEWART.

Gardens.

JOHN G. BARKER, OF JAMAICA PLAIN, CHAIRMAN.

CHAIRMEN OF THE COMMITTEES ON PLANTS, FLOWERS, FRUITS, AND VEGETABLES, *EX OFFICIIS*.

HENRY W. WILSON. JACKSON DAWSON.

Plants.

DAVID ALLAN, OF CLIFTONDALE, CHAIRMAN.

JAMES COMLEY. WILLIAM ROBINSON.
A. C. BOWDITCH. JAMES WHEELER.

Flowers.

ARTHUR H. FEWKES, of Newton Highlands, Chairman.

MICHAEL H. NORTON. WILLIAM J. MARTIN.
E. H. HITCHINGS. J. WOODWARD MANNING, Jr.

Fruits.

E. W. WOOD, of West Newton, Chairman.

BENJAMIN G. SMITH. O. B. HADWEN. SAMUEL HARTWELL.
CHARLES F. CURTIS. WARREN FENNO. J. WILLARD HILL.

Vegetables.

CHARLES N. BRACKETT, of Newton, Chairman.

CEPHAS H. BRACKETT. VARNUM FROST. WARREN H. HEUSTIS.
P. G. HANSON. JOHN C. HOVEY. WILLIAM H. HUNT.

Committee of Arrangements.

JOSEPH H. WOODFORD, of Boston, Chairman.

CHAIRMEN OF THE COMMITTEES ON PLANTS, FLOWERS, FRUITS, VEGETABLES, AND GARDENS, *EX OFFICIIS*.

ROBERT FARQUHAR.

MEMBERS FOR LIFE.

Members of the Society and all other persons who may know of deaths, changes in residence, or other circumstances showing that the following list is inaccurate in any particular, will confer a favor by promptly communicating to the Secretary the needed corrections.

Information, or any clew to it, is especially desired in regard to members whose names are marked thus †.

Adams, Luther, Brighton.
Albro, Charles, Taunton.
Alger, Rev. R. F., Becket.
Allan, David, Cliftondale.
Ames, Frank M., Canton.
Ames, Frederick L., North Easton.
Ames, George, Boston.
Ames, Hon. Oliver, Boston.
Ames, Preston Adams, Boston.
Amory, Charles, Boston.
Amory, Frederick, Boston.
Andrews, Charles L., Milton.
Andrews, Frank W., Washington, D. C.
Andros, Milton, San Francisco, Cal.
Appleton, Edward, Reading.
Appleton, Francis H., Peabody.
†Appleton, William S., Boston.
Atkins, Edwin F., Belmont.
Avery, Hon. Edward, Boston.
Ayling, Isaac, M. D., Brookline.

Bancroft, John C., Boston.
Banfield, Francis L., M. D., Worcester.
Barber, J. Wesley, Newton.
Barnard, James M., Malden.
Barnard, Robert M., Everett.
Barnard, Samuel, Belmont.
Barnes, Walter S., Somerville.
Barnes, William H. Boston.
†Barney, Levi C., Boston.
Barratt, James, East Pasadena, Cal.
Barrett, Edwin S., Concord.
Bartlett, Edmund, Newburyport.
Bates, Hon. Amos, Hingham.
Beal, Leander, Boston.
Becker, Frederick C., Cambridge.
Beckford, Daniel R., Jr., Dedham.
Beebe, Franklin H., Boston.
Berry, James, Brookline.
Birchard, Charles, Framingham.
Black, James W., Cambridge.
Blake, Arthur W., Brookline.
Blakemore, John E., Roslindale.
Blanchard, John W., Dorchester.
Blaney, Henry, Salem.
Blinn, Richard D., Chicago, Ill.
Bliss, William, Boston.
Bocher, Prof. Ferdinand, Cambridge.
Bockus, Charles E., Dorchester.
Botume, John, Wyoming.
Bouvé, Thomas T., Boston.
Bowditch, Azell C., Somerville.
Bowditch, Charles P., Jamaica Plain.
Bowditch, William E., Roxbury.
Bowker, William H., Boston.
Brackett, Cephas H., Brighton.
Brackett, Charles N., Newton.
Bresee, Albert, Hubbardton, Vt.
Brewer, Francis W., Hingham.
Brewer, John Reed, Boston.
†Brigham, William T., Boston.
Brimmer, Martin, Boston.

Brintnall, Benjamin, Charlestown.
Brooks, J. Henry, Milton.
Brown, Alfred S., Jamaica Plain.
Brown, Charles E., Yarmouth, N. S.
Brown, Edward J., Weston.
Brown, George Barnard, Brookline.
Brown, George Bruce, Framingham.
Brown, Jacob, Woburn.
Bruce, Nathaniel F., Billerica.
Bullard, John R., Dedham.
Bullard, William S., Boston.
Burnett, Joseph, Southborough.
Burr, Fearing, Hingham.
Burr, Matthew H., Hingham.
Buswell, Edwin W., Brooklyn, N. Y.
Buswell, Frank E., Brooklyn, N. Y.
Butler, Aaron, Wakefield.
Butler, Edward K., Jamaica Plain.
Butterfield, William P., East Lexington.

Cabot, Edward C., Brookline.
Cadness, John, Flushing, N. Y.
Cains, William, South Boston.
Calder, Augustus P., Boston.
Campbell, Francis, Cambridge.
Capen, John, Boston.
Carlton, Samuel A., Boston.
Carr, Hon. John, Roxbury.
†Carruth, Charles, Boston.
Carter, Miss Maria E., Woburn.
Carter, Miss Sabra, Wilmington.
Cartwright, George, Dedham.
Chadbourne, Marshall W., Mount Auburn.
Chamberlain, Chauncey W., Boston.
Chapin, Nathaniel G., Brookline.
Chase, Andrew J., Lynn.
Chase, Daniel E., Somerville.
†Chase, George B., Boston.
Chase, William M., Baltimore, Md.
Cheney, Benjamin P., Boston.
Child, Francis J., Cambridge.
Childs, Nathaniel R., Boston.
Choate, Charles F., Cambridge.
Claflin, Hon. William, Newtonville.
Clapp, Edward B., Dorchester.
Clapp, James H., Dorchester.
Clapp, William C., Dorchester.
Clark, Benjamin C., Boston.
Clark, J. Warren, Rockville.
†Clark, Orus, Boston.
Clarke, Miss Cora H., Jamaica Plain.
Cleary, Lawrence, West Roxbury.
Clement, Asa, Dracut.
Cobb, Albert A., Brookline.
Coburn, Isaac E., Everett.
Codman, Henry Sargent, Brookline.
Codman, James M., Brookline.
Codman, Ogden, Lincoln.
Coffin, G. Winthrop, West Roxbury.
Coffin, William E., Dorchester.
Collamore, Miss Helen, Boston.
Converse, Elisha S., Malden.
Converse, Parker L., Woburn.
Coolidge, Joshua, Mount Auburn.
Copeland, Franklin, West Dedham.
Cottle, Henry C., Boston.
Cowing, Walter H., West Roxbury.
Cox, Thomas A., Dorchester.
Coy, Samuel I., Boston.
Crawford, Dr. Sarah M., Roxbury.
Crocker, Miss S. H., Boston.
Crosby, George E., West Medford.
†Crowell, Randall H., Chelsea.
Cummings, Hon. John, Woburn.
Curtis, Charles F., Jamaica Plain.
Curtis, George S., Jamaica Plain.
†Cushing, Robert M., Boston.

†Daggett, Henry C., Boston.
Damon, Samuel G., Arlington.
Dana, Charles B., Wellesley.
Davenport, Albert M., Watertown.
Davenport, Edward, Dorchester.
Davenport, George E., Medford.
†Davenport, Henry, Boston.
Davis, John, Lowell.
Dawson, Jackson, Jamaica Plain.
Day, William F., Roxbury.
Dee, Thomas W., Mount Auburn.
Denny, Clarence H., Boston.
Denton, Eben, Dorchester.
Dewson, Francis A., Newtonville.

Dexter, F. Gordon, Boston.
Dickerman, George H., Somerville.
Dike, Charles C., Stoneham.
Dorr, George, Dorchester.
Dove, George W. W., Andover.
Durant, William, Boston.
Durfee, George B., Fall River.
Dutcher, F. J., Hopedale.

Eaton, Horace, Cambridge.
Edgar, William, Waverly.
†Eldridge, E. H., Roxbury.
Ellicott, Joseph P., Boston.
Elliot, Mrs. John W., Boston.
Elliott, William H., Brighton.
Endicott, William E., Canton.
Eustis, William C., Hyde Park.
Everett, William, Dorchester.
Ewell, Warren, Dorchester.

Fairchild, Charles, Boston.
Falconer, William, Glencove, N. Y.
Farlow, Lewis H., Newton.
Farquhar, James F. M., Roslindale.
Farquhar, John K. M. L., Roxbury.
Farquhar, Robert, Boston.
Faxon, John, Quincy.
Fenno, J. Brooks, Boston.
Fewkes, Arthur H., Newton Highlands.
Fisher, David, Montvale.
Fisher, James, Roxbury.
†Fisher, Warren, Boston.
Flagg, Augustus, Boston.
Fleming, Edwin, West Newton.
Fletcher, George V., Belmont.
Fletcher, J. Henry, Belmont.
Fletcher, John W., Chelsea.
Flint, David B., Boston.
Flynt, William N., Monson.
Forster, Edward J., M. D., Boston.
Foster, Francis C., Cambridge.
Fottler, John, Jr., Dorchester.
Fowle, George W., Jamaica Plain.
Fowle, William B., Auburndale.
French, J. D. Williams, Boston.
French, Jonathan, Boston.
French, S. Waldo, Parley Vale.

Galloupe, Charles W., Swampscott.
Galvin, John, Boston.
†Gardner, Henry N., Mount Auburn.
Gardner, John L., Brookline.
Gibbs, Wolcott, M. D., Newport, R. I.
Gill, George B., Medford.
Gillard, William, Atlantic.
Gilmore, E. W., North Easton.
Gilson, F. Howard, Reading.
Glover, Albert, Boston.
Glover, Joseph B., Boston.
Goddard, A. Warren, Brookline.
Goddard, Joseph, Roxbury.
Goddard, Mrs. Mary T., Newton.
Goodell, L. W., Dwight.
Gorham, James L., Jamaica Plain.
†Gould, Samuel, Boston.
Gray, James, Wellesley.
Gregory, Hon. James J. H., Marblehead.
Greig, George, Toronto, Ontario.
Grey, Benjamin, Malden.
Guild, J. Anson, Brookline.

Hadwen, Obadiah B., Worcester.
Hall, Edwin A., Cambridgeport.
Hall, George A., Chelsea.
Hall, George R., Fort George, Fla.
†Hall, John R., Roxbury.
Hall, Lewis, Cambridge.
Hall, Stephen A., Revere.
Hall, William F., Brookline.
Halliday, William H., South Boston.
Hammond, Gardiner G., New London, Conn.
Hammond, George W., Boston.
Hammond, Samuel, Boston.
Hanson, P. G., Woburn.
†Harding, George W., Arlington.
Harding, Louis B., Stamford, Conn.
Hardy, F. D., Jr., Cambridgeport.
Harrington, Nathan D., Somerville.
Harris, Charles, Cambridge.
Harris, Thaddeus William, A. M., Cambridge.
Hart, William T., Boston.
Hastings, Levi W., Brookline.

Hathaway, Seth W., Marblehead.
Hawken, Mrs. Thomas, Rockland, Maine.
Hayes, Daniel F., Exeter, N. H.
Hayes, Francis Brown, Lexington.
†Hazeltine, Hazen, Boston.
Hemenway, Augustus, Canton.
Henshaw, Joseph P. B., Boston.
Heywood, Hon. George, Concord.
Hilbourn, A. J., Boston.
Hill, John, Stoneham.
Hitchings, E. H., Malden.
Hittinger, Jacob, Mount Auburn.
Hoar, Samuel, Concord.
Hodgkins, John E., Newcastle, N. H.
Hollis, George W., Grantville.
Hollis, John W., Allston.
Holmes, Edward J., Boston.
Holt, Mrs. Stephen A., Winchester.
Hooper, Thomas, Bridgewater.
Horner, Mrs. Charlotte N. S., Georgetown.
Horsford, Miss Kate, Cambridge.
Hovey, Charles H., East Pasadena, Cal.
Hovey, John C., Cambridgeport.
Hovey, Stillman S., Woburn.
Hubbard, Charles T., Weston.
Hubbard, Gardner G., Washington, D. C.
Hubbard, James C., Everett.
Humphrey, George W., Dedham.
Hunnewell, Arthur, Wellesley.
Hunnewell, H. Hollis, Wellesley.
Hunnewell, Walter, Wellesley.
Hunt, Dudley F., Reading.
Hunt, Francis W., Melrose.
Hunt, Franklin, Boston.
Hunt, William H., Concord.
Hyde, James F. C., Newton Highlands.

Jackson, Charles L., Cambridge.
Jackson, Robert T., Dorchester.
Janvrin, William S., Revere.
Jeffries, John, Boston.
Jenks, Charles W., Boston.
Johnson, J. Frank, Boston.
Jose, Edwin H., Cambridgeport.
Joyce, Mrs. E. S., Medford.

Kakas, Edward, West Medford.
Kelly, George B., Jamaica Plain.
Kendall, D. S., Woodstock, Ont.
Kendall, Edward, Cambridgeport.
†Kendall, Joseph R., San Francisco, Cal.
Kendall, Dr. W. G., Atlantic.
Kendrick, Mrs. H. P., Allston.
Kennard, Charles W., Boston.
Kennedy, George G., M. D., Milton.
Kent, John, Brookline.
†Keyes, E. W., Denver, Col.
Keyes, George, Concord.
Keyes, John M., Concord.
Kidder, Charles A., Southborough.
Kidder, Nathaniel T., Milton.
†Kimball, A. P., Boston.
King, Franklin, Dorchester.
Kingman, Abner A., Brookline.
Kingman, C. D., Middleborough.
Kinney, John M., East Wareham.
Knapp, Walter H., Newtonville.

Lancaster, Charles B., Newton.
Lawrence, James, Groton.
Lawrence, John, Groton
Learned, Charles A., Arlington.
Lee, Charles J., Dorchester.
Lee, Henry, Boston.
Leeson, Hon. Joseph R., Newton Centre.
Lemme, Frederick, North Cambridge.
Leuchars, Robert B., Boston.
Lewis, A. S., Framingham.
Lewis, William G., Framingham.
Lincoln, George, Hingham.
Lincoln, Col. Solomon, Boston.
Little, James L., Brookline.
Lockwood, Rhodes, Boston.
Lodge, Richard W., Swampscott.
Loftus, John P., Lenox.
Lord, George C., Newton.
Loring, Caleb W., Beverly Farms.

Lovett, George L., West Newton.
†Lowder, John, Watertown.
Lowell, Augustus, Boston.
Luke, Elijah H., Cambridgeport.
Lumb, William, Boston.
Lyman, Col. Theodore, Brookline.
Lyon, Henry, Charlestown.

†Mahoney, John, Boston.
Mallet, E. B., Jr., Freeport, Maine.
Mann, James F., Ipswich.
Manning, Jacob W., Reading.
Manning, Mrs. Lydia B., Reading.
Manning, Robert, Salem.
Manning, Warren H., Brookline.
Marshall, Frederick F., Chelsea.
Martin, John S., Roxbury.
Matthews, Nathan, Boston.
McCarty, Timothy, Providence, R. I.
McClure, John, Revere.
McWilliam, George, Whitinsville.
Melvin, James C., West Newton.
Merriam, Herbert, Weston.
Merriam, M. H., Lexington.
Merrifield, William T., Worcester.
Merrill, Hon. Moody, Roxbury.
Metivier, James, Cambridge.
Milmore, Mrs. Joseph, Newton Lower Falls.
Minton, James, Boston.
Monteith, David, Dedham.
Moore, John H., Concord.
Morrill, Joseph, Jr., Roxbury.
†Morse, Samuel F., Boston.
Motley, Thomas, Jamaica Plain.
Mudge, George A., Portsmouth, N. H.
†Munroe, Otis, Boston.

Needham, Daniel, Groton.
Nevins, David, Framingham.
Newman, John R., Winchester.
Newton, Rev. William W., Pittsfield.
Nickerson, Albert W., Marion.
Nickerson, George A., Dedham.
Norton, Charles W., Allston.
Nourse, Benjamin F., Boston.

Oakman, Hiram A., North Marshfield.
Olmstead, John Charles, Brookline.

Packer, Charles H., Boston.
Paige, Clifton H., Mattapan.
Palmer, Julius A., Jr., Boston.
Parker, Augustus, Roxbury.
Parker, Charles W., Boston.
Parkman, Francis, Jamaica Plain.
Partridge, Horace, North Cambridge.
Paul, Alfred W., Dighton.
Peabody, John E., Boston.
Peabody, Col. Oliver W., Milton.
Pearce, John, West Roxbury.
Peck, Lucius T., Dorchester.
Peck, O. H., Denver, Col.
Peck, William G., Arlington.
Peirce, Silas, Boston.
Penniman, A. P., Waltham.
Perkins, Edward N., Jamaica Plain.
†Perry, George W., Malden.
Philbrick, William D., Newton Centre.
Pierce, Dean, Brookline.
Pierce, George Francis, Dorchester.
Pierce, Henry L., Boston.
Pierce, Samuel B., Dorchester.
Poor, John R., Boston.
Porter, Herbert, Malden.
Porter, James C., Wollaston.
†Potter, Joseph S., Arlington.
Prang, Louis, Roxbury.
Pratt, Laban, Dorchester.
Pratt, Lucius G., West Newton.
Pratt, Robert M., Boston.
Pratt, William, Winchester.
Pray, Dr. Mark W., Boston.
†Prescott, Eben C., Boston,
†Prescott, William G., Boston.
Prescott, William G., Quincy.
Pringle, Cyrus G., Charlotte, Vt.
Proctor, Thomas P., Jamaica Plain.
Prouty, Gardner, Littleton.
Putnam, Joshua H., Brookline.

Quinby, Hosea M., M. D., Worcester.

Raddin, Everett W., North Cambridge.
Rand, Miss Elizabeth L., Newton Highlands.
Rand, Harry S., North Cambridge.
Rand, Oliver J., Cambridgeport.
Rawson, Warren W., Arlington.
Ray, Hon. James F., Franklin.
Ray, Hon. James P., Franklin.
Ray, Joseph G., Franklin.
Raymond, Walter, Cambridgeport.
Read, Charles A., Manchester.
Reed, George W., Boston.
Rice, George C., Worcester.
Richards, John J., Boston.
Richardson, Charles E., Cambridge.
Rinn, J. Ph., Boston.
Ripley, Charles, Dorchester.
Ripley, Ebed L., Hingham Centre.
Robbins, I. Gilbert, Wakefield.
Robinson, John, Salem.
Robinson, Joseph B., Allston.
Ross, Henry, Newtonville.
Ross, Waldo O., Boston.
Ruddick, William H., M. D., South Boston.
Russell, George, Woburn.
Russell, Hon. John E., Leicester.
Russell, Walter, Arlington.

Sampson, George R., Andover.
Sanford, Oliver S., Hyde Park.
Sargent, Charles S., Brookline.
Saville, Richard L., Brookline.
Sawtelle, Eli A., Boston.
Sawyer, Timothy T., Charlestown.
†Scott, Charles, Newton.
Sears, J. Montgomery, Boston.
Shaw, Christopher C., Milford, N. H.
Shorey, John L., Lynn.
Shuman, Hon. A., Roxbury.
Skinner, Francis, Boston.
Smith, Benjamin G., Cambridge.
Smith, Calvin W., Grantville.
Smith, Charles H., Jamaica Plain.
Smith, Charles S., Lincoln.
Smith, Chauncey, Cambridge.
Smith, Edward N., San Francisco.
Smith, George O., Boston.
Smith, James H., Dedham.
Smith, Thomas Page, Waltham.
Snow, Miss Salome H., Brunswick, Me.
Spaulding, Edward, West Newton.
Speare, Alden, Newton Centre.
Spooner, William H., Jamaica Plain.
Springall, George, Malden.
Stetson, Nahum, Bridgewater.
Stewart, William J., Winchester.
Stone, Amos, Charlestown.
Stone, Charles W., Boston.
Stone, George F., Chestnut Hill.
Strong, William C., Waban.
Sturgis, Russell, Manchester.
Sturtevant, E. Lewis, M. D., South Framingham.
Surette, Louis A., Concord.
Swain, Charles E., Roxbury.

Taft, John B., Cambridge.
Tarbell, George G., M. D., Boston.
Taylor, Horace B., Portland, Me.
Temple, Felker L., Somerville.
Thurlow, Thomas C., West Newbury.
Tidd, Marshall M., Woburn.
Tilton, Stephen W., Roxbury.
Todd, John, Hingham.
Tolman, Benjamin, Concord.
†Tolman, Miss Harriet S., Boston.
Torrey, Everett, Charlestown.
†Turner, John M., Dorchester.
Turner, Roswell W., Dorchester.

Underwood, William J., Belmont.

Vanderwoerd, Charles, Waltham.
Vinal, Miss Mary L., Somerville.

Wainwright, William L., Braintree.
Wakefield, E. H., Cambridge.
Walcott, Henry P., M.D., Cambridge.
Wales, George O., Braintree.
Walker, Edward C. R., Roxbury.

Walker, Miss Mary S., Waltham.
Walley, Mrs. W. P., Boston.
Walton, Daniel G., Wakefield.
Ward, Francis Jackson, Roxbury.
Ward, John, Newton Centre.
Wardwell, William H., Brookline.
Ware, Benjamin P., Clifton.
Washburn, Andrew, Hyde Park.
Waters, Edwin F., Boston.
Waters, Dr. George F., Boston.
Watson, Benjamin M., Jr., Jamaica Plain.
Watson, Thomas A., East Braintree.
Watts, Isaac, Waverly.
Webber, Aaron D., Boston.
Weld, Christopher Minot, Jamaica Plain.
Weld, George W., Newport, R. I.
Weld, Moses W., M. D., Boston.
Weld, Richard H., Boston.
Weld, William G., Boston.
West, Mrs. Maria L., Neponset.
Weston, Leonard W., Lincoln.
Weston, Seth, Revere.
Wheeler, Frank, Concord.
Wheelwright, A. C., Brookline.
Whitcomb, William B., Medford.
White, Edward A., Boston.
White, Francis A., Brookline.
White, Joseph H., Brookline.
†Whitely, Edward, Cambridgeport.
Whitten, Charles V., Dorchester.
Whittier, Hon. Charles, Roxbury.
†Whytal, Thomas G., New York, N. Y.
Wilbur, George B., West Newton.
Wilder, Edward Baker, Dorchester.
Wilder, Henry A., Malden.
Willard, E. W., Newport, R. I.
Willcutt, Levi L., West Roxbury.
Williams, Aaron D., Boston.
Williams, Benjamin B., Boston.
Williams, Philander, Taunton.
Willis, George W., Chelsea.
Willis, Joshua C., Roxbury.
Wilson, Col. Henry W., Boston.
Wilson, William Power, Boston.
Winthrop, Robert C., Jr., Boston.
Wood, Charles G., Boston.
Wood, Luke H., Marlborough.
Wood, William K., West Newton.
Woods, Henry, Boston.
Wright, George C., West Acton.
Wyman, Oliver B., Shrewsbury.

Raddin, Everett W., North Cambridge.
Rand, Miss Elizabeth L., Newton Highlands.
Rand, Harry S., North Cambridge.
Rand, Oliver J., Cambridgeport.
Rawson, Warren W., Arlington.
Ray, Hon. James F., Franklin.
Ray, Hon. James P., Franklin.
Ray, Joseph G., Franklin.
Raymond, Walter, Cambridgeport.
Read, Charles A., Manchester.
Reed, George W., Boston.
Rice, George C., Worcester.
Richards, John J., Boston.
Richardson, Charles E., Cambridge.
Rinn, J. Ph., Boston.
Ripley, Charles, Dorchester.
Ripley, Ebed L., Hingham Centre.
Robbins, I. Gilbert, Wakefield.
Robinson, John, Salem.
Robinson, Joseph B., Allston.
Ross, Henry, Newtonville.
Ross, Waldo O., Boston.
Ruddick, William H., M. D., South Boston.
Russell, George, Woburn.
Russell, Hon. John E., Leicester.
Russell, Walter, Arlington.

Sampson, George R., Andover.
Sanford, Oliver S., Hyde Park.
Sargent, Charles S., Brookline.
Saville, Richard L., Brookline.
Sawtelle, Eli A., Boston.
Sawyer, Timothy T., Charlestown.
†Scott, Charles, Newton.
Sears, J. Montgomery, Boston.
Shaw, Christopher C., Milford, N. H.
Shorey, John L., Lynn.
Shuman, Hon. A., Roxbury.
Skinner, Francis, Boston.
Smith, Benjamin G., Cambridge.
Smith, Calvin W., Grantville.
Smith, Charles H., Jamaica Plain.
Smith, Charles S., Lincoln.
Smith, Chauncey, Cambridge.
Smith, Edward N., San Francisco.
Smith, George O., Boston.
Smith, James H., Dedham.
Smith, Thomas Page, Waltham.
Snow, Miss Salome H., Brunswick, Me.
Spaulding, Edward, West Newton.
Speare, Alden, Newton Centre.
Spooner, William H., Jamaica Plain.
Springall, George, Malden.
Stetson, Nahum, Bridgewater.
Stewart, William J., Winchester.
Stone, Amos, Charlestown.
Stone, Charles W., Boston.
Stone, George F., Chestnut Hill.
Strong, William C., Waban.
Sturgis, Russell, Manchester.
Sturtevant, E. Lewis, M. D., South Framingham.
Surette, Louis A., Concord.
Swain, Charles E., Roxbury.

Taft, John B., Cambridge.
Tarbell, George G., M. D., Boston.
Taylor, Horace B., Portland, Me.
Temple, Felker L., Somerville.
Thurlow, Thomas C., West Newbury.
Tidd, Marshall M., Woburn.
Tilton, Stephen W., Roxbury.
Todd, John, Hingham.
Tolman, Benjamin, Concord.
†Tolman, Miss Harriet S., Boston.
Torrey, Everett, Charlestown.
†Turner, John M., Dorchester.
Turner, Roswell W., Dorchester.

Underwood, William J., Belmont.

Vanderwoerd, Charles, Waltham.
Vinal, Miss Mary L., Somerville.

Wainwright, William L., Braintree.
Wakefield, E. H., Cambridge.
Walcott, Henry P., M.D., Cambridge.
Wales, George O., Braintree.
Walker, Edward C. R., Roxbury.

Walker, Miss Mary S., Waltham.
Walley, Mrs. W. P., Boston.
Walton, Daniel G., Wakefield.
Ward, Francis Jackson, Roxbury.
Ward, John, Newton Centre.
Wardwell, William H., Brookline.
Ware, Benjamin P., Clifton.
Washburn, Andrew, Hyde Park.
Waters, Edwin F., Boston.
Waters, Dr. George F., Boston.
Watson, Benjamin M., Jr., Jamaica Plain.
Watson, Thomas A., East Braintree.
Watts, Isaac, Waverly.
Webber, Aaron D., Boston.
Weld, Christopher Minot, Jamaica Plain.
Weld, George W., Newport, R. I.
Weld, Moses W., M. D., Boston.
Weld, Richard H., Boston.
Weld, William G., Boston.
West, Mrs. Maria L., Neponset.
Weston, Leonard W., Lincoln.
Weston, Seth, Revere.
Wheeler, Frank, Concord.
Wheelwright, A. C., Brookline.
Whitcomb, William B., Medford.
White, Edward A., Boston.
White, Francis A., Brookline.
White, Joseph H., Brookline.
†Whitely, Edward, Cambridgeport.
Whitten, Charles V., Dorchester.
Whittier, Hon. Charles, Roxbury.
†Whytal, Thomas G., New York, N. Y.
Wilbur, George B., West Newton.
Wilder, Edward Baker, Dorchester.
Wilder, Henry A., Malden.
Willard, E. W., Newport, R. I.
Willcutt, Levi L., West Roxbury.
Williams, Aaron D., Boston.
Williams, Benjamin B., Boston.
Williams, Philander, Taunton.
Willis, George W., Chelsea.
Willis, Joshua C., Roxbury.
Wilson, Col. Henry W., Boston.
Wilson, William Power, Boston.
Winthrop, Robert C., Jr., Boston.
Wood, Charles G., Boston.
Wood, Luke H., Marlborough.
Wood, William K., West Newton.
Woods, Henry, Boston.
Wright, George C., West Acton.
Wyman, Oliver B., Shrewsbury.

ANNUAL MEMBERS.

Members of the Society and all other persons who may know of deaths, changes of residence, or other circumstances showing that the following list is inaccurate in any particular, will confer a favor by promptly communicating to the Secretary the needed corrections.

Abbott, Samuel L., M. D., Boston.
Allen, Charles L., Floral Park, N.Y.
Arnold, Mrs. Anna E., Roxbury.
Atkinson, Charles M., Brookline.
Atkinson, Edward, Brookline.
Atkinson, William B., Newburyport.

Bacon, Augustus, Roxbury.
Badlam, William H., Dorchester.
Barker, John G., Jamaica Plain.
Beard, Edward L., Cambridge.
Benedict, Washington G., Boston.
Bicknell, Hon. Thomas W., Dorchester.
Bigelow, Arthur J., Eastlake, Worcester.
Bird, John L., Dorchester.
Bird, Mrs. Lewis J., Roxbury.
Bliss, Benjamin K., East Bridgewater.
Bock, William A., North Cambridge.
Bolles, Matthew, Boston.
Bolles, William P., Roxbury.
Bolton, John B., Somerville.
Bowditch, James H., Brookline.
Boyden, Clarence F., Taunton.
Breck, Charles H., Newton.
Breck, Charles H. B., Brighton.
Brooks, George, Brookline.
Brown, David H., West Medford.
Butler, Edward, Wellesley.
Buxton, Mrs. Rose, Peabody.

Carroll, James T., Chelsea.
Carter, Mrs. Sarah D. J., Wilmington.
Chaffin, John C., Newton.
Chase, Joseph S., Malden.
Chase, Leverett M., Roxbury.
Cheney, Amos P., Natick.
Chubbuck, Isaac Y., Roxbury.
Clapp, Henry L., Roxbury.
Clark, John Spencer, Boston.
Clark, Joseph, Manchester.
Clark, Theodore M., Newtonville.
Collins, Frank S., Malden.
Collins, Hon. P. A., Dorchester.
Comley, James, Lexington.
Coolidge, David H., Jr., Boston.
Coolidge, Sumner, Mt. Auburn.
Crosby, J. Allen, Jamaica Plain.
Curtis, Joseph H., Boston.
Curtis, Louville, Tyngsborough.

Davis, Frederick, Saxonville.
Davis, Frederick S., West Roxbury.
Davis, Thomas M., Cambridgeport.
De Mar, John A., Brighton.
Dolbear, Mrs. Alice J., College Hill.
Doliber, Thomas, Brookline.
Doran, Enoch E., Brookline.
Doyle, William E., East Cambridge.
Duffley, Daniel, Brookline.

Eaton, Jacob, Cambridgeport.
Endicott, Miss Charlotte M., Canton.

Faxon, Edwin, Jamaica Plain.
Felton, Arthur W., West Newton.
Fenno, Warren, Revere.
Finlayson, Kenneth, Brookline.
Fisher, Sewall, Framingham.

Forbes, William H., Jamaica Plain.
Foster, Joshua T., Medford.
Frohock, Roscoe R., Malden.
Frost, Artemas, Belmont.
Frost, George, West Newton.
Frost, Varnum, Belmont.
Fuller, T. Otis, Needham.

Gage, Alfred P., Arlington.
Gibbon, Mrs. James A., Brookline.
Gilbert, Samuel, Boston.
Gill, Mrs. E. M., Medford.
Gleason, Herbert, Malden.
Goddard, Thomas, Boston.
Gowing, Mrs. Clara E., Boston.
Grant, Charles E., Concord.
Guerineau, Louis, Cambridge.

Haile, Hon. William H., Springfield.
Hall, Charles H., M. D., Boston.
Hall, Harry B., Roxbury.
Hall, Stacy, Boston.
Hall, William T., Revere.
Hamlin, Delwin A., Allston.
Hanks, Mrs. C. Stedman, Manchester.
Hargraves, William J., Jamaica Plain.
Harris, Miss Ellen M., Jamaica Plain.
Harris, Frederick L., Wellesley.
Hartwell, Samuel, Lincoln.
Harwood, George S., Newton.
Henshaw, Samuel, West Brighton, N. Y.
Hersey, Alfred H., Hingham.
Hersey, Edmund, Hingham.
Heustis, Warren H., Belmont.
Hews, Albert H., North Cambridge.
Hill, Benjamin D., Peabody.
Hill, Edwin S., Clarendon Hill.
Hill, J. Willard, Belmont.
Hobbs, George M., Boston.
Hollis, George, South Weymouth.
Houghton, George S., Auburndale.
Hunt, Henry C., Newton.
Huston, Miss Katharine W., Roxbury.

Jameson, G. W., East Lexington.
Jordan, Hon. Jediah P., Roxbury.

Kenrick, Miss Anna C., Newton.
Kidder, Francis H., Medford.

Lamprell, Simon, Marblehead.
Lancaster, Mrs. E. M., Roxbury.
Langmaid, Mrs. Mary, Somerville.
Lawrence, Henry S., Roxbury.
Lawrence, Sidney, East Lexington.
Lee, Francis H., Salem.
Lee, William W., Northampton.
Lomax, George H., Somerville.
Lombard, Richard T., Wayland.
Loring, Charles G., Boston.
Loring, John A., North Andover.
Lothrop, Thornton K., Boston.
Loud, Mrs. Mary E., Roxbury.
Low, Hon. Aaron, Hingham.
Lowell, John, Newton.
Lunt, William W., Hingham.

Manda, W. A., Short Hills, N. J.
Manning, A. Chandler, Reading.
Manning, J. Woodward, Reading.
Markoe, George F. H., Roxbury.
Martin, William J., Milton.
Masten, Cornelius E., Roxbury.
Maxwell, Charles E., Boston.
May, F. W. G., Boston.
McDermott, Andrew, Roxbury.
McDowell, Mrs. Mary, Boston.
McIntosh, Aaron S., Roxbury.
McLaren, Anthony, Forest Hills.
McMullen, Edgar, Boston.
Meriam, Horatio C., D.M.D., Salem.
Merrill, John J., Roxbury.
Merrill, Capt. S. A., Wollaston Heights.

Newton, John F., Roxbury.
Norton, Edward E., Boston.
Norton, Michael H., Boston.
Norton, Patrick, Boston.

Olmsted, Frederick Law, Brookline.

Park, William D., Boston.
Park, William P., West Boxford.
Parker, George A., Halifax.
Parker, John, Newtonville.
Parker, Walter S., Reading.
Patterson, William, Quincy.
Peirce, George H., Concord.
Peterson, Ellis, Jr., Jamaica Plain.
Petremant, Robert, Dorchester.
Pitcher, James R., Short Hills, N. J.
Plimpton, Willard P., West Newton.
Power, Charles J., South Framingham.
Prichard, Joseph V., Boston.
Purdie, George A., Wellesley Hills.
Putnam, Charles A., Salem.

Randall, Macey, Stoughton.
Reardon, John B., Boston.
Rich, William E. C., Roxbury.
Rich, William P., Chelsea.
Richards, Mrs. P. D., West Medford.
Robbins, Oliver R., Weston.
Robinson, Nathan D., Roxbury.
Robinson, William, North Easton.
Ross, Charles W., Newtonville.
Ross, Henry Wilson, Newtonville.

Saunders, Miss Mary T., Salem.
Sawtell, J. M., Fitchburg.
Schmitt, George A., Boston.
Scott, Augustus E., Lexington.
Scudder, Samuel H., Cambridge.
Seaver, Edwin P., LL.D., Newton Highlands.
Sharples, Stephen P., Cambridge.
Shattuck, Frederick R., Roxbury.
Shedd, Abraham B., Waltham.
Sheppard, Edwin, Lowell.
Snow, Eugene A., Melrose.
Snow, Francis B., Dorchester.
Southworth, Edward, Quincy.
Spencer, Aaron W., Boston.
Squire, Miss Esther A., North Cambridge.
Squire, John P., Arlington.
Stearns, Mrs. Charles A., East Watertown.
Stearns, Charles H., Brookline.
Stevens, Miss Mary O., North Andover.
Stone, Samuel G., Charlestown.
Storer, Charles, Boston.
Story, Miss Sarah W., Brighton.
Strater, Herman, Roxbury.
Swan, Charles W., M. D., Boston.
Sweet, Everell F., Malden.

Tailby, Joseph, Wellesley.
Talbot, Josiah W., Norwood.
Teele, William H., West Acton.
Terry, Rev. Calvin, North Weymouth.
Tobey, Rufus T., Roxbury.
Tobey, S. Edwin, Boston.
Torrey, Bradford, Boston.
Travis, Charles B., Brighton.
Turner, Nathaniel W., Boston.
Tyndale, Theodore H., Brookline.

Vaughan, J. C., Chicago, Ill.

Warren, Samuel H., Weston.
Welch, Patrick, Dorchester.
Weld, Charles E., Roslindale.
Wells, Benjamin T., Newtonville.
Weston, Mrs. L. P., Danvers.
Wheatland, Henry, M. D., Salem.
Wheeler, James, Brookline.
White, George A., Roxbury.
White, Maurice P., Roxbury.
White, W. Henry, Lowell.
Whitney, Joel, Winchester.
Whitney, Joseph, Cambridgeport.
Whiton, Hon. Starkes, Hingham Centre.
Wilcox, George D., M. D., Providence, R. I.
Wilmarth, Henry D., Jamaica Plain.
Wilson, B. Osgood, Watertown.
Winship, Rev. Albert E., Somerville.

Winter, William C., Mansfield.
Wolcott, Mrs. Henrietta L. T., Dedham.
Wood, Mrs. Anna D., West Newton.
Wood, Elijah A., West Newton.
Wood, E. W., West Newton.
Woodford, Joseph H., Boston.
Worthington, Roland, Roxbury.

Young, Arthur W., Hingham.
Young, Charles S., Newton Centre.
Young, E. Bentley, Boston.

Zirngiebel, Denys, Needham.

EXTRACTS FROM THE CONSTITUTION AND BY-LAWS.

SECTION XXVII.— Life Members.

The payment of thirty dollars shall constitute a Life Membership, and exempt the member from all future assessments. And any subscription member, having paid all dues, may become a Life Member by the payment of twenty dollars in addition thereto.

SECTION XXVIII.— Admission Fee and Annual Assessment.

Every subscription member, before he receives his diploma, or exercises the privileges of a member, shall pay the sum of ten dollars as an admission fee, and shall be subject afterwards to an annual assessment of two dollars.

SECTION XXX.— Discontinuance of Membership.

Any member may withdraw from the Society, on giving notice to the Treasurer and paying the amount due from him. Any member who shall neglect for the space of two years to pay his annual assessment, after due notice from the Treasurer, shall cease to be a member. The Treasurer shall give notice of such withdrawals or discontinuances to the Secretary, who shall erase such members' names from the list.

The attention of Annual Members is particularly called to Section XXX.

HONORARY MEMBERS.

Members and correspondents of the Society and all other persons who may know of deaths, changes of residence, or other circumstances showing that the following list is inaccurate in any particular, will confer a favor by promptly communicating to the Secretary the needed corrections.

Information, or any clew to it, is especially desired in regard to Joseph Maxwell, *elected in* 1830, *and* George W. Smith, *elected in* 1851. *The names of those known to be deceased are marked with a star.*

*Benjamin Abbott, LL.D., Exeter, N. H.

*John Abbott, Brunswick, Me.

*Hon. John Quincy Adams, LL.D., late President of the United States, Quincy.

*Professor Louis Agassiz, Cambridge.

*William T. Aiton, late Curator of the Royal Gardens, Kew, England.

*Hon. Thomas Allen, late President of the St. Louis Horticultural Society, St. Louis, Mo., and Pittsfield, Mass.

*Hon. Samuel Appleton, Boston.

*Hon. James Arnold, New Bedford.

*Edward Nathaniel Bancroft, M. D., late President of the Horticultural and Agricultural Society of Jamaica.

*Hon. Philip P. Barbour, Virginia.

*Don Angel Calderon de la Barca, late Spanish Minister at Washington.

*Robert Barclay, Bury Hill, Dorking, Surrey, England.

*James Beekman, New York.

*L'Abbé Berlèse, Paris.

*Nicholas Biddle, Philadelphia.

*Dr. Jacob Bigelow, Boston.

*Mrs. Lucy Bigelow, Medford.

*Le Chevalier Soulange Bodin, late Secrétaire Général de la Société d'Horticulture de Paris.

Hon. George S. Boutwell, Groton.

*Josiah Bradlee, Boston.

*Hon. George N. Briggs, Pittsfield.

*Hon. James Buchanan, late President of the United States, Lancaster, Pa.

*Hon. Jesse Buel, late President of the Albany Horticultural Society, Albany, N. Y.

Hon. Ephraim W. Bull, Concord.

Edmund Burke, late Commissioner of Patents, Washington, D. C.

*Augustin Pyramus de Candolle, Geneva, Switzerland.
*Hon. Horace Capron, late U. S. Commissioner of Agriculture, Washington, D. C.
*Commodore Isaac Chauncey, U. S. Navy, Brooklyn, N. Y.
*Ward Chipman, late Chief Justice of New Brunswick, St. John.
*Lewis Clapier, Philadelphia.
*Hon. Henry Clay, Lexington, Ky.
H. W. S. Cleveland, Minneapolis, Minn.
*Admiral Sir Isaac Coffin, Bart., England.
*Zaccheus Collins, late President of the Pennsylvania Horticultural Society, Philadelphia.
*Roswell L. Colt, Paterson, N. J.
*Caleb Cope, late President of the Pennsylvania Horticultural Society, Philadelphia.
*William Coxe, Burlington, N. J.
*John P. Cushing, Watertown.
*Charles W. Dabney, late U. S. Consul, Fayal, Azores.
*Hon. John Davis, LL.D., Boston.
*Sir Humphry Davy, London.
*Gen. Henry Alexander Scammel Dearborn, Roxbury.
*James Dickson, late Vice-President of the Horticultural Society of London.
*Mrs. Dorothy Dix, Boston.
*Capt. Jesse D. Elliot, U. S. Navy.
*Hon. Stephen Elliot, LL.D., Charleston, S. C.
*Hon. Henry L. Ellsworth, late Commissioner of Patents, Washington, D. C.
*Allyn Charles Evanson, late Secretary of the King's County Agricultural Society, St. John, N. B.
*Hon. Edward Everett, LL.D., Boston.
*Hon. Horace Everett, Vermont.
*F. Faldermann, late Curator of the Imperial Botanic Garden, St. Petersburg.
Hon. Joseph S. Fay, Wood's Holl.
*Hon. Millard Fillmore, late President of the United States, Buffalo, N. Y.
*Dr. F. E. Fischer, late Professor of Botany at the Imperial Botanic Garden, St. Petersburg, Russia.
*Hon. Theodore Frelinghuysen, late President of the American Agricultural Society, New Brunswick, N. J.
*Joseph Gales, Jr., late Vice-President of the Horticultural Society, Washington, D. C.
*George Gibbs, New York.
*Stephen Girard, Philadelphia.
*Hon. Robert T. Goldsborough, Talbot County, Md.
*Ephraim Goodale, South Orrington, Me.
*Mrs. Rebecca Gore, Waltham.

*Hon. John Greig, late President of the Domestic Horticultural Society, Canandaigua, N. Y.

*Mrs. Mary Griffith, Charlieshope, N. J.

*Gen. William Henry Harrison, late President of the United States, North Bend, O.

*S. P. Hildreth, M. D., Marietta, O.

*Thomas Hopkirk, late President of the Glasgow Horticultural Society.

*David Hosack, M. D., late President of the New York Horticultural Society.

*Lewis Hunt, Huntsburg, O.

*Joseph R. Ingersoll, late President of the Pennsylvania Horticultural Society, Philadelphia.

*Gen. Andrew Jackson, late President of the United States, Nashville, Tenn.

*Mrs. Martha Johonnot, Salem.

*Jared Potter Kirtland, M. D., LL.D., East Rockport, O.

*Thomas Andrew Knight, late President of the Horticultural Society of London.

*Gen. La Fayette, La Grange, France.

*Le Comte de Lasteyrie, late Vice-President of the Horticultural Society of Paris.

Major L. A. Huguet-Latour, M. P., Montreal, Can.

*Baron Justus Liebig, Giessen, Germany.

Edward Winslow Lincoln, Secretary of the Worcester County Horticultural Society.

*Professor John Lindley, late Secretary of the Royal Horticultural Society, London.

*Franklin Litchfield, late U. S. Consul at Puerto Cabello, Venezuela.

*Joshua Longstreth, Philadelphia.

*Nicholas Longworth, Cincinnati, O.

*Jacob Lorillard, late President of the New York Horticultural Society.

*John Claudius Loudon, London.

*Hon. John A. Lowell, Boston.

*Baron Charles Ferdinand Henry von Ludwig, late Vice-President of the South African Literary and Scientific Institution, Cape Town, Cape of Good Hope.

*Hon. Theodore Lyman, Brookline.

Col. Theodore Lyman, Brookline.

*Hon. James Madison, late President of the United States, Montpelier, Va.

*Mrs. Charlotte Maryatt, Wimbledon, near London.

Joseph Maxwell, Rio Janeiro.

*D. Smith McCauley, late U. S. Consul-General at Tripoli, Philadelphia.

*Hon. Isaac McKim, late President of the Horticultural Society of Maryland, Baltimore.

Rev. James H. Means, Dorchester.

*James Mease, M. D., Philadelphia.

*Lewis John Mertens, Brussels, Belgium.

*Hon. Charles F. Mercer, Virginia.
*François André Michaux, Paris.
Donald G. Mitchell, New Haven, Conn.
*Samuel L. Mitchill, M. D., LL.D., New York.
*Hon. James Monroe, late President of the United States, Oak Hill, Va.
*Alfred S. Monson, M.D., late President of the New Haven Horticultural Society, New Haven, Conn.
*Hon. A. N. Morin, Montreal, Can.
*Théodore Mosselmann, Antwerp, Belgium.
Baron R. Von Osten Sacken, Heidelberg, Germany.
*Baron Ottenfels, late Austrian Minister to the Ottoman Porte.
*John Palmer, Calcutta.
*Hon. Joel Parker, LL.D., Cambridge.
Samuel B. Parsons, Flushing, N. Y.
Samuel R. Payson, Boston.
*Hon. Thomas H. Perkins, Brookline.
*Antoine Poiteau, late Professor in the Institut Horticole de Fromont.
*Hon. James K. Polk, late President of the United States, Nashville, Tenn.
*John Hare Powel, Powelton, Pa.
*Henry Pratt, Philadelphia.
*William Prince, Flushing, N. Y.
*Rev. George Putnam, D. D., Roxbury.
*Col. Joel Rathbone, late President of the Albany and Rensselaer Horticultural Society, Albany, N. Y.
*Archibald John, Earl of Rosebery, late President of the Caledonian Horticultural Society.
Hon. Jeremiah Rusk, Secretary of Agriculture, Washington, D. C.
*Joseph Sabine, late Secretary of the Horticultural Society of London.
*Don Ramon de la Sagra, Havana, Cuba.
*Henry Winthrop Sargent, Fishkill, N. Y.
*Sir Walter Scott, Abbotsford, Scotland.
*John Shepherd, late Curator of the Botanic Garden, Liverpool, England.
*John S. Skinner, late Editor of the American Farmer, Baltimore, Md.
George W. Smith, Boston.
*Stephen H. Smith, late President of the Rhode Island Horticultural Society.
*Hon. Charles Sumner, Boston.
*Hon. John Taliaferro, Virginia.
*Gen. James Talmadge, late President of the American Institute, New York.
*Gen. Zachary Taylor, late President of the United States, Baton Rouge, La.
*James Thacher, M. D., Plymouth.
John J. Thomas, Union Springs, N. Y.
*James W. Thompson, M. D., Wilmington, Del.
*Grant Thorburn, New York.

*M. Du Petit Thouars, Paris.
*Le Vicomte Héricart De Thury, late President of the Horticultural Society of Paris.
*Mons. Tougard, late President of the Horticultural Society of Rouen, France.
*Gen. Nathan Towson, late President of the Horticultural Society, Washington, D. C.
*Hon. John Tyler, late President of the United States, Williamsburg, Va.
*Rev. Joseph Tyso, Wallingford, England.
*Hon. Martin Van Buren, late President of the United States, Kinderhook, N. Y.
*Federal Vanderburg, M. D., New York.
*Jean Baptiste Van Mons, M. D., Brussels, Belgium.
*Gen. Stephen Van Rensselaer, Albany, N. Y.
*Joseph R. Van Zandt, Albany, N. Y.
*Benjamin Vaughan, M. D., Hallowell, Me.
*Petty Vaughan, London.
*Rev. N. Villeneuve, Montreal, Can.
*Pierre Phillippe André Vilmorin, Paris.
*James Wadsworth, Geneseo, N. Y.
*Nathaniel Wallich, M. D., late Curator of the Botanic Garden, Calcutta.
*Malthus A. Ward, M. D., late Professor in Franklin College, Athens, Ga.
*Hon. Daniel Webster, Marshfield.
*Hon. John Welles, Boston.
*Jeremiah Wilkinson, Cumberland, R. I.
Hon. Robert C. Winthrop, Boston.
*Frederick Wolcott, Litchfield, Conn.
*Ashton Yates, Liverpool, England.
*Lawrence Young, late President of the Kentucky Horticultural Society, Louisville.

CORRESPONDING MEMBERS.

Members and correspondents of the Society and all other persons who may know of deaths, changes of residence, or other circumstances showing that the following list is inaccurate in any particular, will confer a favor by promptly reporting to the Secretary the needed corrections.

Information, or any clew to it, is especially desired in regard to Alexander Burton, *elected in* 1829, S. Reynolds, M. D., 1832, *and* Francis Summerest (or Summerer), 1833. *The names of those known to be deceased are marked with a star.*

*John Adlum, Georgetown, D. C.

*Don Francisco Aguilar y Leal, Late U. S. Vice-Consul at Maldonado, Banda Oriental del Uruguay.

*Mons. Alfroy, Lieusaint, France.

*James T. Allan, late President of the Nebraska State Horticultural Society, Omaha.

*Anthony B. Allen, Plainfield, N. J.

*Rev. Thomas D. Anderson, D. D., South Boston.

Édouard André, Redacteur en chef de la Revue Horticole, Paris, France.

*Thomas Appleton, late U. S. Consul at Leghorn, Italy.

*Col. Thomas Aspinwall, Late U. S. Consul at London, Brookline.

*P. M. Augur, State Pomologist, Middlefield, Conn.

Professor L. H. Bailey, Jr., Cornell University, Ithaca, N. Y.

*Isaac Cox Barnet, late U. S. Consul at Paris.

*Patrick Barry, late Vice-President of the American Pomological Society, Rochester, N. Y.

*Augustine Baumann, Bolwiller, Alsace.

*Eugène Achille Baumann, Rahway, N. J.

*Joseph Bernard Baumann, Bolwiller, Alsace.

Napoleon Baumann, Bolwiller, Alsace.

D. W. Beadle, St. Catherine's Ontario.

Professor William J. Beal, Agricultural College, Michigan.

*Noel J. Becar, Brooklyn, N. Y.

*Edward Beck, Wharton Cottage, Isleworth, near London.

*Rev. Henry Ward Beecher, Peekskill, N. Y.

*Louis Édouard Berckmans, Rome, Ga.

Prosper J. Berckmans, President of the American Pomological Society, Augusta, Ga.

Charles E. Bessey, Ph.D., Industrial College of the University of Nebraska, Lincoln.

*Alexander Bivort, late Secretary of the Société Van Mons, Fleurus, Belgium.
*Tripet Le Blanc, Paris.
Dr. Ch. Bolle, Berlin, Prussia.
*Charles D. Bragdon, Pulaski, Oswego Co., N. Y.
*William D. Brinckle, M. D., Philadelphia.
*George Brown, late U. S. Commissioner to the Sandwich Islands, Beverly.
John Croumbie Brown, LL.D., Haddington, Scotland.
*John W. Brown, Fort Gaines, Ga.
*Dr. Nehemiah Brush, East Florida.
*Arthur Bryant, Sr., late President of the Illinois State Horticultural Society, Princeton.
Professor J. L. Budd, Secretary of the Iowa Horticultural Society, Ames.
*Robert Buist, Philadelphia.
*Dr. E. W. Bull, Hartford, Conn.
William Bull, Chelsea, England.
*Rev. Robert Burnet, Ex-President of the Ontario Fruit Growers' Association, Milton.
Alexander Burton, United States Consul at Cadiz, Spain, Philadelphia.
Isidor Bush, Bushberg, Jefferson Co., Mo.
George W. Campbell, President of the Ohio State Horticultural Society, Delaware, O.
*Francis G. Carnes, New York.
*Col. Robert Carr, Philadelphia.
*Rev. John O. Choules, D. D., Newport, R. I.
*Rev. Henry Colman, Boston.
*James Colvill, Chelsea, England.
Maxime Cornu, Directeur du Jardin des Plantes, Paris, France.
Benjamin E. Cotting, M. D., Boston.
*Samuel L. Dana, M. D., Lowell.
*J. Decaisne, late Professeur de Culture au Muséum d'Histoire Naturelle, Jardin des Plantes, Paris.
*James Deering, Portland, Me.
*H. F. Dickehut.
*Sir C. Wentworth Dilke, Bart., London.
*Hon. Allen W. Dodge, Hamilton.
Rev. H. Honywood D'Ombrain, Westwell Vicarage, Ashford, Kent, England.
Robert Douglas, Waukegan, Ill.
*Andrew Jackson Downing, Newburg, N. Y.
*Charles Downing, Newburg, N. Y.
Malcolm Dunn, Dalkeith, Scotland.
W. T. Thistleton Dyer, C.M.G., F.R.S., Director of the Royal Botanic Gardens, Kew, England.
Parker Earle, President of the American Horticultural Society, Cobden, Ill.

*F. R. Elliott, late Secretary of the American Pomological Society, Cleveland, O.

George Ellwanger, Rochester, N. Y.

Henry John Elwes, F.L.S., F.Z.S., Colesborn, Andoversford, Gloucestershire, England.

*George B. Emerson, LL.D., Winthrop.

*Ebenezer Emmons, M. D., Williamstown.

*Andrew H. Ernst, Cincinnati, O.

William G. Farlow, M. D., Professor of Cryptogamic Botany, Harvard University, Cambridge.

*Nathaniel Fellows, Cuba.

*Henry J. Finn, Newport, R. I.

*Willard C. Flagg, late Secretary of the American Pomological Society, Moro, Ill.

*Michael Floy, late Vice-President of the New York Horticultural Society, New York.

*John Fox, Washington, D. C.

*Hon. Russell Freeman, Sandwich.

Andrew S. Fuller, Ridgewood, N. J.

*Henry Weld Fuller, Roxbury.

Hon. Robert W. Furnas, President of the Nebraska State Horticultural Society, Brownville.

*Augustin Gande, late President of the Horticultural Society, Department of Sarthe, France.

*Robert H. Gardiner, Gardiner, Me.

*Benjamin Gardner, late U. S. Consul at Palermo, Sicily.

*Capt. James T. Gerry, U. S. Navy.

*Charles Gibb, late Corresponding Secretary of the Fruit Growers' Association, Abbottsford, Quebec.

*Abraham P. Gibson, late U. S. Consul at St. Petersburg.

*R. Glendinning, Chiswick, near London.

Charles A. Goessmann, Ph.D., Director of the State Agricultural Experiment Station, Amherst.

Professor George L. Goodale, Cambridge.

*George W. Gordon, late U. S. Consul at Rio Janeiro, Boston.

*Professor Asa Gray, Cambridge.

Obadiah B. Hadwen, Ex-President of the Worcester County Horticultural Society, Worcester.

*Charles Henry Hall, New York.

*Abraham Halsey, late Corresponding Secretary of the New York Horticultural Society, New York.

*Dr. Charles C. Hamilton, late President of the Fruit Growers' Association and International Show Society of Nova Scotia, Cornwallis.

*Rev. Thaddeus Mason Harris, D. D., Dorchester.

*Thaddeus William Harris, M. D., Cambridge.

J. H. Hart, Superintendent of the Botanic Garden, Trinidad.

*John Hay, late Architect of the Caledonian Horticultural Society.

*Bernard Henry, late U. S. Consul at Gibraltar, Philadelphia.
*Dr. F. M. Hexamer, Editor of the American Agriculturist, New York.
*Shirley Hibberd, late Editor of the Gardeners' Magazine, London.
*J. J. Hitchcock, Baltimore.
Robert Hogg, LL.D., Editor of the Journal of Horticulture, London.
*Thomas Hogg, New York.
*Thomas Hogg, Jr., New York.
J. C. Holding, Ex-Treasurer and Secretary of the Cape of Good Hope Agricultural Society, Cape Town, Africa.
Rev. S. Reynolds Hole, Rochester, England.
Sir Joseph Hooker, K.C.S.I., The Camp, Sunningdale, England.
Josiah Hoopes, West Chester, Pa.
Professor Eben Norton Horsford, Cambridge.
*Sanford Howard, Chicago, Ill.
*Dr. William M. Howsley, late President of the Kansas State Horticultural Society, Leavenworth.
*Isaac Hunter, Baltimore, Md.
*Isaac Hurd, Cincinnati, O.
George Husmann, Napa, Cal.
*Professor Isaac W. Jackson, Union College, Schenectady, N.Y.
*Thomas P. James, Cambridge.
*Edward Jarvis, M.D., Dorchester.
John W. P. Jenks, Middleborough.
William J. Johnson, M.D., Fort Gaines, Ga.
Charles Joly, Vice-President of the Société d'Horticulture de France, Paris.
Dr. George King, Superintendent of the Royal Botanic Garden, Calcutta.
*Samuel Kneeland, M.D., Boston.
*Mons. Laffay, St. Cloud, near Paris, France.
*David Landreth, late Corresponding Secretary of the Pennsylvania Horticultural Society, Bristol.
*Charles C. Langdon, Mobile, Ala.
Professor William R. Lazenby, Secretary of the Agricultural Experiment Station, Columbus, O.
*Dr. William LeBaron, late State Entomologist, Geneva, Ill.
Max Leichtlin, Baden-Baden, Germany.
G. F. B. Leighton, President of the Norfolk Horticultural and Pomological Society, Norfolk, Va.
Victor Lemoine, Nancy, France.
*E. S. H. Leonard, M.D., Providence, R.I.
*André Leroy, Author of the Dictionnaire de Pomologie, Angers, France.
J. Linden, Ghent, Belgium.
*Hon. George Lunt, Scituate.
T. T. Lyon, President of the Michigan Horticultural Society, South Haven.
*F. W. Macondray, San Francisco, Cal.
Dr. P. MacOwan, Director of the Botanic Garden, Cape Town, Africa.
*James J. Mapes, LL.D., Newark, N. J.

*A. Mas, late President of the Horticultural Society, Bourg-en-Bresse, France.
Dr. Maxwell T. Masters, Editor of the Gardeners' Chronicle, London.
*James Maury, late U. S. Consul at Liverpool, England.
George Maw, Benthal, Kinley, Surrey, England.
*C. J. de Maximowicz, St. Petersburg, Russia.
T. C. Maxwell, Geneva, N.Y.
*William Sharp McLeay, New York.
*James McNab, late Curator of the Botanic Garden, Edinburgh, Scotland.
Thomas Meehan, Germantown, Pa.
*Allan Melvill, New York.
*John Miller, M.D., late Secretary of the Horticultural and Agricultural Society of Jamaica.
*Stephen Mills, Flushing, N.Y.
*Charles M'Intosh, Dalkeith Palace, near Edinburgh.
*Joseph E. Mitchell, late President of the Pennsylvania Horticultural Society, Philadelphia.
Dr. Charles Mohr, Mobile, Ala.
*Giuseppe Monarchini, M.D., Canea, Isle of Candia.
*Édouard Morren, late Editor of the Belgique Horticole, Liège, Belgium.
D. Morris, F.L.S., Assistant Director of the Royal Botanic Gardens, Kew, England.
Ch. Naudin, Antibes, France.
*Horatio Newhall, M.D., Galena, Ill.
George Nicholson, Curator of the Royal Botanic Gardens, Kew, England.
*David W. Offley, late U. S. Consular Agent at Smyrna, Turkey.
*James Ombrosi, late U. S. Consul at Florence, Italy.
*John J. Palmer, New York.
*Victor Paquet, Paris.
*John W. Parker, late U. S. Consul at Amsterdam, Holland.
*André Parmentier, Brooklyn, N.Y.
William Paul, Waltham Cross, London, N.
*Sir Joseph Paxton, M.P., Chatsworth, England.
*John L. Payson, late U. S. Consul at Messina, Sicily.
Professor D. P. Penhallow, Director of the Botanic Garden, Montreal, Can.
*Commodore Matthew C. Perry, U. S. Navy, Charlestown.
*David Porter, late U. S. Chargé d'Affaires at the Ottoman Porte, Constantinople.
*Alfred Stratton Prince, Flushing, N.Y.
*William Robert Prince, Flushing, N.Y.
Henry Probasco, Cincinnati, O.
P. T. Quinn, Newark, N.J.
*Rev. W. F. Radclyffe, London, England.
*William Foster Redding, Baltimore, Md.
D. Redmond, Ocean Springs, Miss.
*Dr. Edward Regel, St. Petersburg, Russia.

S. Reynolds, M. D., Schenectady, N. Y.
*John H. Richards, M. D., Illinois.
*Dr. T. G. Richardson, University of Louisiana, New Orleans, La.
Charles V. Riley, Entomologist to the U. S. Department of Agriculture, Washington, D. C.
*Mons. J. Rinz, Jr., Frankfort-on-the-Main, Germany.
*Thomas Rivers, Sawbridgeworth, Herts, England.
William Robinson, Editor of The Garden, London.
*Bernhard Rosser, M. D., Bamberg, Bavaria.
*Dr. J. Smith Rogers, New York.
*Capt. William S. Rogers, U. S. Navy.
*Thomas Rotch, Philadelphia.
*George R. Russell, Roxbury.
*John B. Russell, Indianapolis, Ind.
*Rev. John Lewis Russell, Salem.
Edgar Sanders, Chicago, Ill.
William Saunders, Department of Agriculture, Washington, D. C.
*William Shaler, late U. S. Consul-General at Havana, Cuba.
*Henry Shaw, St. Louis, Mo.
*William Shaw, New York.
*Caleb R. Smith, Burlington, N. J.
*Daniel D. Smith, Burlington, N. J.
*Gideon B. Smith, late Editor of the American Farmer, Baltimore, Md.
*John Jay Smith, Germantown, Pa.
William R. Smith, Curator of the Botanic Garden, Washington, D. C.
*Horatio Sprague, late U. S. Consul at Gibraltar.
Robert W. Starr, Port William, N. S.
Dr. Joseph Stayman, Leavenworth, Kan.
*Capt. Thomas Holdup Stevens, U. S. Navy, Middletown, Conn.
William A. Stiles, Editor of Garden and Forest, Deckertown, N. J.
*William Fox Strangeway, late British Secretary of Legation at Naples, Italy.
*Dr. J. Strentzel, Martinez, Cal.
*Judge E. B. Strong, Rochester, N. Y.
*James P. Sturgis, Canton, China.
William Summer, Pomaria, S. C.
Francis Summerest.
*Professor Michele Tenore, late Director of the Botanic Garden at Naples, Italy.
*James Englebert Teschemacher, Boston.
*Robert Thompson, Chiswick, near London.
*George C. Thorburn, New York.
*Professor George Thurber, late Editor of the American Agriculturist, New York.
*John Tilson, Jr., Edwardsville, Ill.
*Cav. Doct. Vincenzo Tineo, late Director of the Botanic Garden at Palermo, Sicily.

Dr. Melchior Treub, Director of the Botanic Garden, Buitenzorg, Java.
*Luther Tucker, late Editor of The Cultivator, Albany, N. Y.
*Carey Tyso, Wallingford, England.
*Louis Van Houtte, Ghent, Belgium.
*Alexander Vattemare, Paris.
H. J. Veitch, Chelsea, England.
Henry L. de Vilmorin, Secrétaire de la Société Nationale d'Agriculture de France, Paris.
*Emilien de Wael, late Secretary of the Horticultural Society, Antwerp, Belgium.
*John A. Warder, M. D., late President of the Ohio State Horticultural Society, North Bend, O.
Anthony Waterer, Knapp Hill, near Woking, Surrey, England.
*Sereno Watson, Ph.D., Cambridge.
*J. Ambrose Wight, late Editor of the Prairie Farmer, Chicago, Ill.
*Benjamin Samuel Williams, Upper Holloway, London, N.
*Professor John Wilson, Edinburgh University, Scotland.
*William Wilson, New York.
*Hon. J. F. Wingate, Bath, Me.
*Gen. Joshua Wingate, Portland, Me.
*Joseph Augustus Winthrop, Charleston, S. C.

Experiment Station Reports Wanted.

The Massachusetts Horticultural Society is endeavoring to collect complete sets of the Bulletins and other publications of all the Agricultural Experiment Stations in the United States and Canada. Those named below are wanting, and any person having a spare copy will confer a favor by addressing the Librarian of the Society, Horticultural Hall, Boston.

A considerable number of duplicates are on hand, which will be exchanged for any of those in which the Society is deficient.

Alabama.—(Ag. and Mech. College Station).—Bulletins 1 (1883), 2–6 (1884), 7–10 and 1–4 (1885), 5–9 (1886), 1, 2, and 3 (1887).

Arkansas.—Bulletins 1 and 4.

California.—Bulletins 8 and 17, 1875; 23, 1876; 26, 1877; 32, 1878; and 1, 2, 3, 5, 50, 66, new series.

Colorado.—Bulletin 3.

Connecticut (New Haven Station).—Bulletins 1 to 67, inclusive. Annual Reports for 1877 to 1883, inclusive.

Illinois.—Bulletin 1, 1885; 2, 1886; 3 and 4, 1887. (Issued as bulletins of the University.)

Indiana (Purdue Univ. School of Ag.).—Bulletin 1. College Reports 1 to 14, inclusive.

Kentucky.—Bulletin 10.

Maryland.—Special Bulletin G.

Minnesota.—All Reports previous to the Biennial Report for 1885 and 1886.

Missouri.—Bulletins 9, 13, 15, 16, 17, 19, 20, 22, 25, 26, 28, 29, and 33 of Old Series. All annual Reports since the first, for 1888.

New Jersey.—Bulletins 1, 4, 5, 15, 27, and 28.

New York (Cornell).—Annual Report, 1882–83. (Report of Agricultural Department of Cornell University.)

North Carolina.—Bulletins 1 to 56, inclusive, and 69, 2d ed. Meteorological Division, Bulletin 2 (*68b*), and 2d and 3d Annual Reports, for 1888 and 1889. Special Bulletins 1 (*77a*) and 4 (*82a*). Weekly Weather Crop Bulletins 1–21, 1888; 1–24, 1889; 1–25, 1890; 2 and 4, 1891. Press Bulletins 1–36.

North Dakota.—Bulletin 3.

Ohio.—All Bulletins of First Series.

Pennsylvania.—Bulletins 1–16 (1882–1886). Annual Reports for 1869, 1872, 1879–80, 1881, 1882, 1883, 1884. [All issued by the State College.]

South Carolina.—All Bulletins of the Old Series (previous to 1888) on the work of the Experimental Farm of the South Carolina College. Third Annual Report for 1890.

Tennessee.—Report, 1882. Bulletin 1, 1884. Report, 1885–86. [Reports of work in the Agricultural Department of the University of Tennessee.]

Texas.—College Bulletins 1–5, 1883–'87.

West Virginia.—Special Bulletin,—Potash and Paying Crops, 1890.

Ottawa, Ont., Central Experimental Farm.—Dairy Bulletin 2.

Toronto, Ont., Bureau of Industries.—All Bulletins previous to No. 22.

TRANSACTIONS

OF THE

Massachusetts Horticultural Society,

FOR THE YEAR 1893.

PART I.

BOSTON:
PRINTED FOR THE SOCIETY.
1893.

☞ SEE LAST PAGE OF COVER.

TRANSACTIONS

OF THE

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FOR THE YEAR 1893.

PART I.

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The following papers and discussions have been circulated to some extent in the form of slips reprinted from the reports made by the Secretary of the Society in the "Boston Transcript." As here presented, the papers are printed in full, and the discussions are not only much fuller than in the weekly reports, but, where it appeared necessary, have been carefully revised by the speakers.

The Committee on Publication and Discussion take this opportunity to repeat what they have before stated, that the Society is not to be held responsible for the certainty of the statements, the correctness of the opinions, or the accuracy of the nomenclature in the papers and discussions now or heretofore published, all of which must rest on the credit or judgment of the respective writers or speakers, the Society undertaking only to present these papers and discussions, or the substance of them, correctly.

O. B. Hadwen,
J. D. W. French,
C. Minot Weld,
Committee on Publication and Discussion.

TRANSACTIONS

OF THE

Massachusetts Horticultural Society.

BUSINESS MEETING.

SATURDAY, January 7, 1893.

A duly notified stated meeting of the Society was holden at eleven o'clock. The chair was taken by the President, WILLIAM H. SPOONER.

In the absence of the Secretary, the President appointed Miss Charlotte M. Endicott, Secretary *pro tem.*

President Spooner then delivered his valedictory address, as follows:

ADDRESS OF PRESIDENT SPOONER.

Ladies and Gentlemen: In retiring from the position with which you have honored me, I wish to thank you all for the pleasant relations which have existed between us, and to rejoice with you that your united efforts have continued and developed the prosperity of the Society.

Our mortgage debt is virtually cancelled, and our building has been put in good order, with new drains very thoroughly constructed; also the upper hall has been provided with new seats, making both halls now in excellent condition for public meetings.

We have had the encouragement of a largely increased attendance at our meetings for discussion, and the interest has been greatly stimulated by interchange of experiences,—a strong factor in every work.

The printed TRANSACTIONS, which at the time of my coming into office had been delayed by the fire and various causes, have now,

with additional temporary help to our able and valued Secretary, been brought up to the second part of 1892, and placed in the hands of members through the mails, a measure which strengthens the general interest in the work and must be a convenience to those members of the Society who are not able to attend its meetings, or visit the Library.

Although the Library room was enlarged in 1889, the added shelf-room has already been filled, and the Committee in charge are asking for more. One of the marked features of our growth is the greater magnitude of our weekly, as well as our special exhibits, but in the latter we are often unpleasantly confronted with the fact that our hall space is quite inadequate to do justice to our contributors. The great Plant Exhibition held by our Society in Music Hall, in August, 1890, was one of the finest ever seen, and will long be remembered by all who witnessed it; a new infusion of zeal and enterprise seemed to follow this grand display, being manifested in our succeeding shows. The Society's appropriations for prizes and gratuities have increased from $6,000 in 1890 to $7,850 in 1893.

We find the additions to membership nearly balanced by the depletion from death and withdrawal. In 1890 there were added 12 life and 7 annual members, making 19; previous to that, the enumeration of deaths or withdrawals was not kept separately for each year. In 1889 and 1890 the number of deaths of life members was 21, and of annual members deceased and dropped 12. In 1891 the life membership addition was 15, annual 19, deaths of life members 21, and from annual members, deaths and withdrawals, 11. In 1892 there were added, life members 17, and annual members 23; while 28 life members died, and among the annual members were 11 deaths and withdrawals.

One of the prominent points in the past three years was the revisal and amendment of the Society's Constitution and By-Laws, which was done in July, 1891.

Within a few days the sum of $10,000 was invested in a sinking fund, and the Treasurer's account, December 31, will show a cash balance of $12,417.19 including $5,397.78 received from Mount Auburn Cemetery.

With entire confidence in your enlarging future prosperity I have the pleasure of introducing President Nathaniel T. Kidder.

Address of President Nathaniel T. Kidder.

Ladies and Gentlemen of the Massachusetts Horticultural Society: I realize that I have undertaken a great responsibility in accepting the office of President of this Society, a Society now nearly sixty-four years old. But it is not of its past that I am expected to speak today, but of its future, and I hope that I may find some detail in which I can improve it.

As I come to the chair the cry on all sides from all the Committees is for more room. When the first Committee said to me "we want more room," I could not help seeing that it did need more, nor could I help thinking that the claim of the next Committee was equally well based. The Society does need more room. Its present quarters are cramped and inconvenient — outgrown.

Often you have appointed a Committee to consider the suggestions of your incoming President, and perhaps you will deem it advisable to do so this year. I would like to suggest that your Executive and Finance Committees be requested to bear in mind the increasing need for space for the proper carrying on the work of the various Officers and Committees and report to the Society if they can find any suitable site where we might build or otherwise acquire such accommodations as would meet the requirements of a growing society, with a growing library, with growing exhibitions, in a growing city. If the subject were thus referred to these Committees, which you have formed of men selected from your number as pre-eminently interested in, and able to conduct your affairs, it could be considered carefully and not hurried through.

When I said just now that the Officers and Committees need more room I meant to include the demands of the Library which, indeed, it hardly seems as if I need urge again, as I think you must all appreciate how rapidly the collection of books increases and how many volumes it is still desirable to add from what has already been published, to say nothing of acquiring such works as are printed from year to year as may aid us in our work or recreation. Growth is imperative to keep up the interest, the value, of the Library! I leave the Library Committee with regret, but hope that you will respond to the appeal which I have made for a more generous lodging for the books. I am bound to

say further that I do not consider the Library sufficiently protected against fire, even though at the time the gallery was added such precautions as could be taken were taken to make the room partially—*partially* fireproof.

A busy horticulturist has not time to study entomology. But could not we, as a Society of many members, conduct a branch which would facilitate a familiarity with insects and methods of destroying them? Much time must be wasted in experimenting with the extermination of garden and greenhouse pests which could be saved if we had a ready means of determining species and learning what insecticides were in best repute for exterminating particular insects. We have had exhibited in our rooms the gypsy moth in its various stages, but there are many other destructive insects which might well be shown in a like manner, to call our attention to their various transformations and enable us to guard against our assailants more intelligently.

I think most of you feel that our exhibitions are not all as well attended as could be wished. Is not this partly because there is not enough variety from year to year? One of the most interesting exhibits which I noticed during the past year, partly because so unusual, was a collection of herbs. I am sorry to say they were in a far corner and without their names attached. And this leads me on to the careful labelling of plants and flowers shown, and I must say that I think we ought to be more careful about this, and insist that everything should conform to the printed rule.

Let us not run any risk in our essays and discussions of revolving in too limited a circle. It were better that some papers seem beyond our province than that we fail to consider anything which could have any bearing whatsoever on our primary subject of Horticulture. I feel sure that the Committee which has this in charge would be glad of suggestions of topics or speakers, and I feel certain that the Committee of one year is enough in accord with that of the previous year to receive gladly such suggestions as might be put in the records for want of time or opportunity to carry them out.

I wish further to suggest that your Window Gardening Committee be proposed by the Nominating Committee named by your President, and voted for at the same time and in the same manner as the other officers of the Society; such alterations

being made in the Constitution and By-Laws as this change would necessitate.

We have a good deal of routine business before us, as this is the first meeting in the year so I will not take more time, but let my deeds take the place of words, trusting that I make the good impression at the end of the year instead of at the beginning.

I rely on the help of the Society, collectively and individually.

Robert Kent James, of Dorchester, was proposed by Henry W. Wilson as an Annual Member of the Society.

Francis H. Appleton read the report of the Committee appointed at the last meeting to consider the extermination of insect pests; also the draft of a bill designed to effect that object. He then moved the following vote:

Voted: That a Committee of three members of the Society be appointed, who shall be empowered to appear before any Committee of the General Court of 1893, in advocacy of such legislation for the suppression of insects as they may deem advisable.

After remarks by Benjamin P. Ware, William H. Spooner, Leverett M. Chase, and William C. Strong, on motion of J. D. W. French, it was voted, that the report, with the recommendations, be accepted. It was also voted that the same Committee be continued and requested to appear before the Legislature.

On motion of Leverett M. Chase it was voted that a Committee of three be appointed by the Chair to secure a portrait of the retiring President. The Chair stated that he would announce the Committee hereafter.

The President reported from the Executive Committee a recommendation that the Society make the following appropriations for the year 1893:

For Prizes for Plants, ...	$2,050
" " " Flowers, ...	2,400
" " " Fruits, ...	1,800
" " " Vegetables, . . .	1,100
" " " Gardens, ...	500
Total for prizes, ...	$7,850

For the Committee on Window Gardening, this sum to cover all incidental expenses of that Committee, and to be paid through the regular channels, . . .	$250
For the Committee of Arrangements, this sum to cover all extraordinary expenses of said Committee, .	400
For the Committee on the Library, for the purchase of Magazines and Newspapers, Binding of Books and incidental expenses of said Committee, . .	300
For the same Committee, to continue the Card Catalogue of Plates, ...	100
For the Committee on Publication and Discussion, including the income of the John Lewis Russell Fund,	300
For the salaries of the Treasurer and Superintendent, the Secretary and Librarian, and the Assistant to the latter, ...	3,600

These appropriations were voted unanimously by the Society.

The President also announced the appointment by the Executive Committee, of Robert Manning as Secretary and Librarian, and Charles E. Richardson as Treasurer and Superintendent of the Building, for the year 1893.

J. D. W. French moved that a Committee of three be appointed to consider the suggestions contained in the address of President Kidder, said Committee to be appointed by the Chair.

William H. Spooner offered an amendment to the motion, providing that the suggestions concerning the Library and Building be referred to the Executive Committee. Mr. French's motion, as thus amended, was carried, and the President stated that he would announce the Committee at the next meeting.

Joseph H. Woodford announced, by request of the Committee on Plants, the election of David Allan as Chairman of that Committee, to fill the vacancy caused by the resignation of Frederick L. Harris.

The President announced that the Schedule of Prizes for 1893, and the Programme of Meetings for Discussion, were printed and had been sent to the members of the Society.

The following named persons, having been recommended by the Executive Committee, were on ballot duly elected members of the Society:

Mrs. GEORGE M. COBURN, of Boston,
THOMAS WESTWOOD, of Jamaica Plain,
ROBERT GRAHAM, of Reading,
BERNARD P. VERNE, of Lynnfield Centre.

Adjourned to Saturday, January 14.

BUSINESS MEETING.

SATURDAY, January 14, 1893.

An adjourned meeting of the Society was holden at eleven o'clock, the President, NATHANIEL T. KIDDER, in the chair.

Lawrence Cotter, of Dorchester, was proposed by Charles E. Richardson, and Amos M. Leonard, of Boston, by Leverett M. Chase, as members of the Society.

Mrs. H. L. T. Wolcott, Chairman of the Committee on Window Gardening, read the Annual Report of that Committee, which was accepted and referred to the Committee on Publication.

The President announced the Committee to obtain a portrait of the retiring President as follows: Leverett M. Chase, Samuel Hartwell, and Benjamin G. Smith, and

The Committee to consider that part of the Annual Address not referred to the Executive Committee, as J. D. W. French, Samuel H. Scudder, and Bradford Torrey.

Francis H. Appleton read a circular from George M. Robinson, of Elmira, N. Y., containing a draft of a bill prepared by him, for the reduction of postage on matter pertaining to Agricultural and kindred societies. Mr. Appleton offered the following vote:

Voted, That the Secretary be instructed to notify the promoter of this bill of its approval by this Society, and request that the printed matter sent through the mails by Horticultural Societies, in promotion of the objects for which they are incorporated, be included in the bill.

The vote was unanimously passed.

Adjourned to Saturday, January 21.

MEETING FOR DISCUSSION.

Village Improvement.

By B. G. Northrop, LL.D., Ex-Secretary State Board of Education of Connecticut, Clinton, Conn.

The inscription on the marble tablet at the entrance of this Horticultural Hall, shows what ground the Massachusetts Horticultural Society has to be proud of its history from the very outset. That mural record fitly claims the notice of every visitor to these words:

To the
MASSACHUSETTS HORTICULTURAL SOCIETY,
the community is indebted for
MOUNT AUBURN CEMETERY:
the foundation and consecration of which
was one of its first acts,
and in whose improvement, embellishment and
preservation, it has a perpetual interest.

It is a great honor to this Society that the first successful effort to secure a rural cemetery on a liberal and comprehensive plan, in this country or in any other land, was made under its auspices.

Mount Auburn Cemetery was established in 1831. Although the custom of sepulture outside of cities, in gardens and groves, prevailed among the Jews, the Egyptians, the Greeks and Romans, and Eastern Christians and the Turks, and even from the times of the patriarchs down to our day, no ornamented rural cemetery on the scale of Mount Auburn could then be found in the United States nor even in the world. It contains an area of 125 acres of native woodland. The granite tower, sixty-two feet in height, which crowns the principal eminence of this area, commands one of the finest prospects in the environs of Boston, and shows that the grounds have been laid out with true landscape art, giving the aspect of a "well managed park, the lots being only so far ornamented with shrubs and flowers as to constitute rich borders to the avenues and pathways." Mount Auburn was not only the pioneer, but the model, of the many beautiful cemeteries now found near our larger cities. The expenditures of the Massachusetts Horticultural Society for Mount Auburn Cemetery have proved a profitable investment as well as a leading factor in cultivating public taste in the line of

landscape gardening and rural adornment. The fact of over $5,000 received the last year from the sale of Mount Auburn lots is one of many illustrations in point. The present interest of the Society in Arbor Day, and in Village Improvement, is therefore in keeping with all its most useful history.

Massachusetts has long taken a prominent part in village improvement. The first incorporated improvement society was the Laurel Hill Association of Stockbridge, formed in 1853, by Mary Hopkins, a kinswoman of Dr. Mark Hopkins, who ever showed a deep interest in its plans for the benefit of his native town. Its anniversary — happily observed for forty years, with social reunions, orations, poems, or post-prandial speeches — has proved an attractive and useful festival to Stockbridge and Berkshire County. Its influence has extended widely over Massachusetts and the country.

The Public Green Association, formed by Hon. James Hillhouse about one hundred years ago, in New Haven, when it was a rural town, is a good illustration of an improvement society, short-lived and yet surviving in an influence steadily increasing and greater now than ever. Though Mr. Hillhouse was the benefactor of New Haven and of Yale College in many other ways, his richest legacy was the lessons of civic pride and local patriotism which have so long inspired its citizens, making it a city of beautiful homes, favoring liberal appropriations and inviting large gifts for parks and public improvements.

It may seem like carrying coals to Newcastle to address a Boston audience on town improvements, for this city has not only been long celebrated for its manifold attractions, but also for its beautiful surrounding villages, stretching out on all sides for twenty miles or more. Where in this land or any other is there a city of its size environed with such a circle of beautiful towns? How much has recently been done towards realizing the glowing picture of Sylvester Baxter, who, a dozen years ago, said, "The ideal suburbs of the future will consist of clusters and groups of beautiful and happy homes encompassing the great city like a garden, the villages nestling among park-like surroundings, while pleasant drive-ways connect beautiful hills and lakes and streams on every side with each other, making the circuit from Nahant to Nantasket an uninterrupted round of joys to the eye." "The great parkway stretching from the end of Commonwealth Avenue, passing

through the Back Bay Fens, embracing Jamaica Pond, skirting the Arnold Arboretum and Franklin Park, and finally reaching the Marine Park in South Boston, when completed, will be the great feature of the system and will furnish a continuous and interesting drive of about fifteen miles." How grand will be that park system of Boston, when it shall also include the Middlesex Fells north of the city, and the Blue Hill range on the south!

This Village Improvement movement initiated in Massachusetts, has spread across the continent so that no state is now showing greater interest in it than California. Even to a stranger visiting that state, it seems to be in the air, as a wholesome epidemic. Proofs of its prevalence meet one on every hand. Borough organizations spontaneously glide into improvement societies. The practical and economic value of sanitary and æsthetic betterments there, goes without saying. Climate, soil, salubrity, irrigation, town-pride, ambition to make one's place a residential town or winter resort, happily combine to intensify this sentiment in many portions of the Golden State.

The chief object of these societies is to make the environments of the home and the village healthful and attractive. Grand as are the palaces of the nobility in Europe, the homes of Americans in comfort and taste surpass those of the people in any other land. Of the many causes of the recent progress in this line, the improvement societies now doing their benign work widely over our country are not the least. Their influence has by no means been limited to the towns or counties where they have been organized, for the discussions they have prompted, the plans and ideals thus advocated by the press of the country, have benefited and brightened myriads of isolated homes, even where no improvement societies have yet been formed.

The dwellings of any people tell their condition and character, their education, thrift, and ambition, or sloth and debasement. In all ages and countries, the homes of the people have been the index of their barbarism or civilization. Christianity has ever marked its triumphs over paganism by improving the homes of its converts. The multiplied ministries of nature, providence, and religion centre in the maintenance of happy homes. It has long been my ambition to help in improving the homes and home life of the people. When one strives to realize the true ideal and

makes his home his pet and pride, that noble aim brings new cheer and inspiration for his daily duties.

But there still remain desolate dwellings innumerable, where flowers, vines, or trees, with a lawn, would make the wilderness blossom as the rose. Slatternliness in and around the house repels from their country homes, many youth who might otherwise be bound in strongest ties to the fireside.

The most progressive towns are most conscious of remaining defects and, therefore, most appreciative of organized efforts for the general good. Our best towns without an improvement society often fall far short of what they might be and ought to be, for in them, here and there, are unsightly private grounds and dwellings which give an air of shiftlessness, sadly marring the effect of an otherwise beautiful village. Wherever an improvement society develops town-pride and public spirit, such defacements disappear. When every citizen is thus stimulated to make his own wayside free from rubbish and neat and attractive, the whole town becomes so inviting as to give new attractions and value to all its homes.

It is high praise to any people that they fondly cherish their homes. Even a stranger can hardly drive through such a town without saying, "Here are people of refinement who tastefully guard the surroundings of their daily life." These surroundings, trifling as they may seem, are constant and vital forces. Clearing up and dusting are little matters in housekeeping, but how soon would the house become forbidding, were these trifles neglected! Just so in a village; let minor matters be slighted and the comfort, content, reputation, and prosperity of a whole community suffer. But, worst of all, home life suffers and character deteriorates. Modern civilization relates to the homes and social life of the people — to their health, thrift, and intellectual and moral advancement.

In earlier ages men were counted in the aggregate and valued as they helped to swell the revenues or retinues of kings. The government was the unit, and each individual only added one to the roll of soldiers or serfs. Happily for us, the family is the unit of the state, and government is for the people as well as by the people. This gives to the concrete, all the characteristics that make the home beautiful. Thus love of home is primary patriotism.

When recently surveying a town in order to adapt my lecture to local needs, as we passed a large house and spacious barns, with neglected surroundings, my escort said, "Here lives the richest and meanest man of our town. Twenty years ago, he brought here a refined young lady as a bride. It was her ambition and delight to adorn her new home without and within. At length her strong, innate love of the beautiful was cruelly crushed, for this heartless wretch 'would no longer permit such waste of her time on good for nothing posies.' Driven to despair, she has been for years in the State Asylum among the incurably insane."

When in Nebraska City, the guest of Ex-Governor J. Sterling Morton,* of Nebraska, I found a happy contrast to this miser's wretched home. To this state, then a territory, just ceded by the Indians to the United States and still a wilderness, he brought his bride, a cultivated lady from Detroit, who bravely made the best of their log-hut. Soon flowers, shrubs, and vines sprang up on every side, until at length a veritable Eden — largely planted and tilled by her hands — surrounded her humble cabin. In a few years, a stately mansion, beautiful within as without, rose in its place,— its choicest adornments being her own artistic work. How much did her love of the beautiful and her purpose to create this paradise, on which her heart was set, when she first saw this spot and saw too its possibilities, lighten the burdens and lessen the privations of a pioneer life. Bright visions of a beautiful home were an inspiration and a benediction to that happy household years before they were realized. It seems fitting that such a home, fitly named "Arbor Lodge," should be the birthplace of Arbor Day. Never has there been so universal mourning at the death of any private citizen of Nebraska City, as when the queen of that happy family was borne to the new cemetery which she was foremost in securing and adorning.

Tree planting, however important, is by no means the leading aim of these improvement societies. There are towns in which the axe-man is needed as well as the tree-planter. There are streets, parks, and home-yards, too densely shaded. Large trees

*Now Secretary of the United States Department of Agriculture. Never did any private citizen of Nebraska receive such an ovation from men of all parties as did Secretary Morton on returning home after receiving this nomination in Washington.

in little yards close to the homes — especially the beautiful hemlock or denser Norway spruce — are unwholesome. There is need of iterating the old motto, "Where the sunlight can't come, the doctor must."

It is a good omen that interest in the embellishment of rural homes is so widely extending and that the varied charms of the country, with its superior advantages for the physical, mental, and moral training of children are attracting so many to the simpler employments and enjoyments of suburban towns or of rural life. There the home naturally becomes the first and chief place to promote love of flowers, vines, shrubs, and trees by cultivating them, and then the better place to cultivate home affections, provide home enjoyments, and foster home courtesies. In the every-day intercourse of home, there should be a more sacred observance of the amenities of life and a freer interchange of kindly feeling. As flowers seem worthless only to the senseless, so the morning and evening salutations in the family may seem little in themselves, but when fitly observed they are mighty in their influence because they are daily — yes, constant — factors in forming character. As the sunbeam is composed of many minute rays, so the home should be illumined and brightened by Nature's richest hues without; and still more within, by winning smiles, cordial greetings, sweet laughter, and nameless little kindnesses. Such beauties of Nature and art, such amenities and affections, should be the sunshine of every home. They refresh and purify the social circle. Like the clinging vine, they twine themselves around the heart, calling forth its purest emotions and securing its most healthful activity. Such a home is worthy the name "an ordinance of God." Such a home here is the true school for a better home above.

If parents combine to make the circle of home life beautiful without and within, they will sow in the hearts of their children the seeds of truth, kindness, and fidelity, from which they may reap a harvest of happiness and virtue. The memory of a beautiful and happy home and a sunny childhood is one of the richest legacies parents can leave to their children. The heart will never forget its hallowed influences. It is a fountain of enjoyment to which the lapse of years will only add new sweetness. Such a memory is a constant inspiration for good and restraint from evil. If taste and culture brighten our homes and adorn our grounds

and music adds its charms, our children will find the healthful pursuits and pleasures of rural homes more attractive than the glare and whirl of city life. Such early occupations and enjoyments tend to invest home life and school life and all one's future with new interest and value and joyousness, for life is ever what we make it.

Though far more has been accomplished in this line than I ever expected to witness when enlisting in the service twenty-five years ago, yet compared with the public needs and the rich opportunities for results now opening widely over the land, this work seems just begun. Instead of one person making it his vocation, there is room for scores of workers in this rich field. This cause has indeed enlisted the hearty sympathy and coöperation of many of the ablest and best men in the land and especially of clergymen, irrespective of sect, for they early realized that its social, educational, moral, and religious bearings are even more important than the financial gain. They have been the foremost advocates of the cardinal idea that in the home is the lever which is to lift up humanity.

The aims of these associations vary in different towns with local needs, and include public health, especially the sanitary conditions in homes and their surroundings; roads, roadsides, sidewalks, school and church yards, cemeteries, parks, and other public lands, as well as private estates; the grounds around railway stations, lighting and parking streets; providing drinking troughs, tanks, or fountains; organizing free town libraries; removing nuisances and front fences, and doing whatever else the exigencies of a town may suggest for its growth and betterment. They often serve the purpose of boards of trade in cities, and in all they help promote good fellowship and invite general coöperation.

The charm of country life, so dependent on neighborly courtesies, is often marred by needless alienations and wrangles. It tends to harmonize a community when all classes work together for common objects, and differences of rank, sect, or party are forgotten. Then neighbors and fellow-townsmen will think more of one another, more of their town, and, best of all, more of their homes. These associations foster that public spirit and town pride which naturally invite liberal plans and gifts. They impressively put to every citizen the question, "What do I owe to my town, what is it my duty, or rather my privilege to do for it?"

The sentiment that cherishes one's homestead and town is noble and ennobling, and has characterized the greatest and best men the world has ever seen. The man who cares not for his native town nor for that of his adoption, has no heart in his bosom. An example is found in an American railway king, a millionaire, never showing interest in his adopted or his native town, leaving his old homestead neglected and forlorn. Such a fact suggests a selfish soul, sterile in all heroic virtues. Patriotism and philanthropy never thrive in the soil which produces no local attachments.

Each town therefore needs to be distinctly conscious of itself, jealous of its honor, preserving its history, keeping up that just pride for its past which is an inspiration for the future, realizing that it has a life as definite in development as does an individual, and therefore cultivating true local ambitions and elevating local ideals.

Under such appeals, large gifts are often made to village improvement societies, not only by citizens, but by natives, now non-residents. Rich men would oftener respond to these calls, were the need duly presented. Large sums come in pleasant surprises from them, so that the membership fee is only one of the smaller rills that fill the treasury Are there not thousands of wealthy men all over this land, who, as they learn of the improvements going on in their native towns, will be glad to show their substantial sympathy? From such liberal non-resident natives, I often receive the response, "Let me share in the good work going on in the home of my youth." Such men gratefully remember how much they owe to the scenery, employments, and varied influences of rural homes. How many have lately learned the wisdom of giving while living, and especially of giving to their own towns, where they can see and enjoy the results. It has been a privilege to meet so many men who identify themselves with the interests of their towns and enrich their own lives by their generous devotion to the public weal. What a contrast such characters present to the grasping and avaricious niggard, unhappy and unloved in life and unmourned in death!

Village improvement is often carried on by individual as well as by organized efforts, where a citizen or a family of liberal views and large means, become the benefactors of their towns by gifts for libraries, cemeteries, parks, fountains, memorial halls, schools, or other institutions and improvements. Massachusetts is full of

such examples, of which I can here name but one. Easton, especially North Easton, has been enriched by the enterprise and munificence of the brothers, Oliver and Oakes Ames, and their sons. The Battell family have greatly beautified and improved their native town of Norfolk, Connecticut, and thus enriched their own lives as well. The Fairbanks families, to the third generation, in St. Johnsbury, Vermont, have had a like happy experience.

Faribault, Minnesota, furnishes a suggestive example of the priceless value to any town of a single wise, far-sighted citizen, though without money. When Rev. Henry B. Whipple, thirty-three years ago, was elected the first Bishop of Minnesota, the citizens of Faribault offered liberal inducements to secure his residence with them, though four years previously it was an Indian village, with a single frame house, the trading-post of the Indian Agent, Alexander Faribault. Bishop Whipple has proved a great benefaction to the town in manifold ways. Through his influence, the three great educational institutions of the Episcopalians in Minnesota, were located here — the Seabury Divinity School, the Shattuck School for boys, with a generous endowment from Boston, and St. Mary's Hall for girls. Through the same influence, here also are three important State institutions, one each for the blind, the deaf and dumb, and the imbeciles. The spacious buildings for these six institutions are beautifully located on extensive grounds — several hundred acres in all — which practically constitute a charming park for the citizens, open to all, with fine groves, lawns, statuary, winding drives, and walks. Bishop Whipple and his assistant, the Rev. J. Dobbin, Rector of the Shattuck School, are the embodiment of village improvement, and such confidence is placed in their taste and judgment that their recommendations are effective. Though I made an inspection of the town, as is my custom, in order to meet local exigencies, I found the "needs" less than in any other Western town of its size that I have visited. With admitted defects, it is justly called the "Model Town" of Minnesota.

My lecture occurred on the eve of the twenty-fifth anniversary of Mr. Whipple's bishopric. It was a privilege to hear the merited tributes to his great achievements in Church and State, and his success in the civilization and evangelization of the Indians, among whom he was known as "Straight Tongue."

His later work in awakening public interest in behalf of Indian Education has been of national importance and has probably influenced the action of Congress more than that of any other man except Senator Dawes. As an Indian missionary preacher, a trustee of the Peabody Fund, and as a wise and efficient Bishop, he is justly held in honor widely over the country, but in Faribault he is recognized as a great benefactor of the town by his noble character and personal influence. Often names honored abroad are tarnished at home. After mingling freely with the citizens, it was delightful to observe with what unanimity there was paid to him that heart-felt tribute of homage and affection which only a noble character and valued services can command. Too many men of equal culture and ability in suburban or rural towns, are so isolated and apart from their fellow-citizens as to leave little or no impress on the community. Bishop Whipple's example is fitted to make many others.

Among the minor aims of these improvement societies, are the providing of rustic seats under the shades for the comfort of pedestrians, pleasantly suggesting neighborly friendliness; securing watering-troughs for horses at convenient points where, from adjacent hill-sides, never-failing springs facilitate such kindness to animals; commending neutral tints for dwellings in place of the glaring white formerly so common; furnishing plans for rural architecture, and showing that the conditions of economy, taste, and convenience can be met without adopting an enlarged dry-goods box as the sole model; preventing nuisances like depositing rubbish along the streets, or painting advertisements on the rocks by the myriad nostrum venders, or the tearing up the turf fronting dwellings by inconsiderate road-menders. There is ample room for the needful work of the scraper, without making unsightly cuts in front of residences; or preventing enroachment upon the highway everytime the fence boundary is made. The removal of front fences should be cautiously advocated. On a large corner-lot, or on a great thoroughfare near a cattle-market, or in some towns in Southern Indiana and Southern Illinois, where the battle of the hogs and cows has never been fought, the fence is still essential. There the specious plea prevails, that the street or common is the poor man's pasture, so that the enforcement of a stock law would deprive him of his inalienable rights. But in an intelligent town, a fair discussion usually wins the victory for a

liberal policy. This has been tried in so many cases, east and west, that I confidently urge all villagers thus afflicted to contend for the abatement of this nuisance.

Many country towns, naturally salubrious, have suffered greatly from neglect of hygienic laws. Sanitarians say that at least one-third of the diseases of modern life are preventable, and that in our country, fully 120,000 deaths occur annually from preventable causes, and as there are on an average, twenty-eight times as many cases of sickness as of death, there are over three and one third million sicknesses from preventable disease. There has been a far greater advance in sanitary science during the last fifty years than in any previous century. But the *popular appreciation* of this science has not kept pace with its discoveries. The pressing demand now is the diffusion of the art of sanitation — the practical application of its methods — by the people at large. Lecturing in every township of Massachusetts and Connecticut, while for over twenty-six years serving these States, and also in most of the other States, I have often learned of the ravages of fatal diseases caused by impure air, impure soil, and impure water. Hence I always place among the objects of every improvement society which I organize, "the promotion of public health by securing better sanitary conditions in our homes and their surroundings." I often find faulty drains, or a stagnant pool under the kitchen window, or neglected privies, or cess-pools too near the well, or a cellar made foul by rats, cats, or decaying vegetables, tainting the air of the whole house. It is often difficult to convince householders of danger from their water supply, and yet I seldom inspect a country town, where there is not obvious need of the warning "Look carefully to your wells." In speaking of such defects, the utmost frankness is usually welcomed. In one town — a large summer resort — where I had made the usual survey of its needs, I described a stagnant malarious pool covered with green scum, not eighty feet from a dwelling-house, and not twelve-hundred feet from the church in which we were assembled, when the Chairman of the Selectmen rose and said, "That shall be drained in two weeks." I had hardly finished the description of a glaring defect of a different kind, when another gentleman made the welcome announcement, "That shall be remedied in two days." Hearty applause greeted these best speeches of the evening. Indeed I have seldom

observed any sign of displeasure at the description of the defects of a town, when courteously made for the purpose of remedying them. Watering-places naturally healthful sometimes become death-pools, when made the home of a dense crowd in the hottest months of the year. Usually such unwelcome discoveries are accepted as facts and the remedies applied, but sometimes they are treated as absurd alarms, and gross ignorance and carelessness hold their ground undisturbed.

Many village improvement societies have been efficient in securing free public libraries. Sixteen years ago, Pasadena in California was a wild ranch, and its only streets were sheep-paths. A "Village Improvement and Library Association" was organized twelve years ago, which formed wise plans for its lay-out and development. It now has fine broad avenues without front fences, lined with palms, fern-leafed peppers, English walnuts, and other choice trees. Its forty miles of stone sidewalks averaging eight feet in width are the best I have seen in any town of its size. It has no saloons, but so many improvements and so choice a community that it is fitly regarded as the model town of Southern California. Its beautiful library building owned by its improvement society, and its fine library are hereafter to be liberally supported by taxation.

The Free Public Library system of Massachusetts was originated in 1847 by Dr. Francis Wayland, President of Brown University, who tendered five hundred dollars to the little town named in honor of him, on condition that its citizens should raise an equal sum for a free town library — a condition promptly met. Dr. Wayland expressed the hope that the towns around Wayland would secure libraries. Such was the result sooner than he expected, for he builded better than he knew. All these towns— Framingham, Concord, Waltham, Weston, Natick, Sudbury, Sherborn— now have flourishing libraries. The words of President Wayland, emphasized by his gift, summoned attention to the need of public libraries. The press of Boston and of Massachusetts commended his views and his action. Edward Everett, Josiah Quincy, Jr., John P. Bigelow, and others helped by pen and tongue and purse in the scheme for the Boston Library, which owed its success to the fact that it had from the outset the counsel and patient thought and liberal support of the most eminent citizens of Boston.

Nothing reflects more credit upon Massachusetts during the last forty years, than the history of her free libraries. The act legalizing their support by taxation, enacted forty years ago, has stood the crucial test of experience. While for nearly eleven years agent of the State Board of Education, and visiting every town and advocating the organization of libraries, I seldom encountered objections to the library law. Massachusetts may well glory in the fact that it now has 307 free libraries, containing in the aggregate more than 2,500,000 volumes available for all of the 2,238,943 inhabitants excepting 45 of the smallest and poorest towns with a total population of hardly 60,000. There is no other equal area on this globe so well supplied with free libraries. Munificent gifts have been made to them in money — not including books —exceeding $5,500,000. Libraries have often been the cause or result of village improvement which so directly fosters public spirit.

DISCUSSION.

Rev. Calvin Terry said there were many sides to the subject presented today — economical, educational, sanitary, civilizing. In the economical view, our gray-headed members can recollect when it was considered necessary, in our villages, to build at considerable cost, a picket, or some other style of fence, in front of every house, to protect the lawn, flower-beds, choice shrubs, or other decorative plants from the depredations of stray cattle or other animals which were allowed to range at large; and streets that were intended to be from thirty to sixty feet wide were rendered quite narrow by permitting the growth of wild shrubs and sometimes trees upon a wide margin on either side. These thoroughfares can be cleared, and, under the influence of the improvement societies, many have been thus treated, transforming them into attractive avenues, making them practically much wider in reality, as well as to the eye. And how much more decently children behave, when passing along a clean and beautiful highway! The educational influence of their surroundings is refining and elevating, and will tend to restrain both the smooth-faced boys and some bearded ones who do not outgrow their boyish propensities. But where the roads are neglected and dilapidated, the recklessness of youth finds vent in wanton destructiveness.

The sanitary aspect of the topic has been well treated by the lecturer. The temptation to throw garbage and dead creatures upon

the highway is removed when neatness prevails along the borders. Negligence and slovenliness in this regard will breed a pestilence in a village, while the thoughtless people wonder why it is so sickly.

The civilizing influence is substantially involved in the other three topics — especially the educational — for they tend to raise the tone of public sentiment and develop a higher standard of social life. Even the boyish ones will learn to appreciate beauty and to respect the rights and feelings of those whose premises are neat and fruitful.

This subject commends itself to all. But the people will not be willing to remove their fences unless they can have protection. The laws now require all to take care of their own cattle and horses, and to prevent unnecessary trespassing upon the highways; but — to say nothing more about marauding boys — what have we to prevent the depredations of dogs? Think of half a dozen dogs of from fifty to a hundred pounds weight, running at large over your lawns and gardens! So lawless and indecent as they are, I would as soon have a cow in my garden as such dogs. We need a law restraining them,— and I would suggest to the lecturer that he add a sentence or two to his lecture upon this topic and try to secure such enactments as shall protect the public from this nuisance.

Leverett M. Chase believed that we could not have any laws enforced that went much beyond the average spirit of the people. He was convinced that the best protection was more elevated thought and public sentiment; these would give protection when fences, even as high as the walls of Babylon, could not keep out the hoodlums. He declared that he loved dogs, but he knew there were very many of them that should be made food for grape vines and other fruit and vegetable plants. He was greatly moved by what the lecturer had said. Home is the garden where we are prepared for heaven.

Mr. Chase moved that a vote of thanks be passsed to Dr. Northrop, for his interesting and instructive lecture. The motion was unanimously carried.

O. B. Hadwen, Chairman of the Committe on Discussion, announced that on the next Saturday, Warren H. Manning, of Brookline, would present a paper upon "Landscape Gardening."

BUSINESS MEETING.

SATURDAY, January 21, 1893.

An adjourned meeting of the Society was holden at eleven o'clock, the President, NATHANIEL T. KIDDER, in the chair.

Samuel J. Trepess, of Brookline, was proposed by Arthur W. Blake, as a member of the Society. Mrs. R. Josephine Cobb, of Attleborough, was proposed by Joseph H. Woodford, as an Annual Member of the Society.

Adjourned to Saturday, January 28.

MEETING FOR DISCUSSION.

LANDSCAPE GARDENING.

BY WARREN H. MANNING, Brookline.

Landscape Gardening, Landscape Architecture, or Landscape Engineering, are terms which are employed to represent a profession concerning which very little is understood by the majority of people.

Many have the impression that the landscape gardener's work only begins when the house is completed,—that it consists merely of grading, sodding, seeding, and planting. As a result of this popular ignorance there are many nurserymen, florists, and contractors who make this kind of work a part of their business, and who add to their business announcements one of the above titles, usually that of Landscape Gardener. This branch of the plant dealer's business gives an opportunity to use plants that may not at the time be in demand and of which they may have a surplus. It is in general their practice to give about the same treatment to all places, irrespective of characters or surroundings; to remove all natural rocks or bushes, grade to a smooth surface, sod or seed, and then plant throughout the open spaces and along the walks and borders the common, usually exotic, plants, with an assortment of the horticultural forms that happen at the time to be in fashion and are easily and cheaply procured in the nurseries. Their attempts to go beyond the ordinary practice too often result in such offences to good taste as a rockery in the center of a fine bit of

lawn, which, as usually made, is and always must be a bare and ugly pile of rocks; or a discarded iron kettle in which nothing creditable can be grown, placed on a rustic tripod and the whole arrangement painted bright red; or useless walks and roads with unmeaning and unnecessary crooks.

There is an impression abroad — with many, a conviction — that there is a higher practice as a profession, by which finer and more original and artistic results are secured, but with this impression is the feeling that this practice is only within the reach of cities or wealthy individuals, and is so far beyond the means of small property owners that it is not worth their time to look into it. This is a wrong impression, for even the smallest place is worthy the attention of the landscape architect, and there is as much reason for securing his services in the selection, arrangement, and construction of the grounds as there is in the employment of an architect for the buildings. A properly equipped landscape architect would be able to secure a much better result in every way, for the same expenditure of money that is required to lay out and complete the first planting of the place in an ordinary way. This higher practice of the profession should usually begin with the selection of the property on which a home is to be established, for the landscape architect in consultation with his client can often detect advantages and disadvantages that would be entirely overlooked by the ordinary observer, and, knowing the tastes and requirements of his client, can determine the amount of land necessary to carry out these requirements properly and thus often save a heavy expense in the purchase of additional land, found to be necessary after the first purchases are made, at a much increased cost over that first secured. The pieces of land in most towns with the greatest possibilities for the making of an original, interesting, and often unique place are very likely the ones longest neglected and least sought for, because their picturesque natural features or irregular surfaces will not lend themselves readily to the smoothing-out process which most land undergoes, or to square lots as laid out by the real estate agent with the assistance of the land surveyor.

I have in mind an old worked-out limestone quarry, in a dense wood, which is overgrown with ferns, vines, and bushes, and near it a summit commanding a fine view, with an open field sloping away from it. In another place a ridge of great angular

fragments of rocks, which is shaded and carpeted by pines; near by, a pleasant slope, at the base of which is one of the finest white oaks I know. At another place a beautiful undulating surface, with splendid white oaks and chestnuts, and at one side a bit of meadow with a pool, surrounded by masses of bayberry, blueberry, azalea, rhodora, and all the pretty plants and flowers that go with them. At another place there is a beautiful tree-fringed meadow,—a perfect little park in itself. All these are within less than a mile of railroad stations and with low valuations.

We may hope to see the time when such lots will be fully appreciated and such trees preserved,—not destroyed, as I know one splendid elm to have been, because to go around it a slight curve in a walk to the front door of a cheap house would be necessary.

In the selection of land, healthfulness should be one of the first considerations. It should be well drained land or that which can be well drained — preferably a porous, sandy, or gravelly soil. This applies particularly to the land where the house is to stand, for nothing can be more unhealthful and disagreeable than a damp cellar, and when the condition is such that it becomes necessary to moor a raft to the cellar stairs to be used on occasions when one has to go fishing for coal and potatoes, it is not only unhealthful, but ruinous to one's disposition. Good sanitary conditions in the neighborhood are as important as good drainage. If it is thickly settled, the ground may be saturated from leaking cesspools. Rubbish heaps, barn-yards, sink-drains, and vaults should be investigated and the purity of the water supply should be looked into. A pleasing outlook from the grounds is a very desirable feature; if not a landscape it may be a fine tree or a tree-arched street, or a bit of your neighbor's well-kept grounds. The topography of the land is also to be considered. A steep slope toward or away from the road is expensive and difficult to build upon, but often very sightly and cool in summer and warm in winter, if on the right side of the hill. A gentle slope toward the road gives good surface drainage and an easy approach. A gentle slope away from the road is not bad, and if properly managed, a pleasing result may be secured with a house set below the road level. The most satisfactory result can often be obtained on an irregular piece of land, and very often the irregularities can be so utilized as to make construction more economical than on a flat piece. Ledges and bowlders often form very interesting

and valuable incidents, giving the place an individuality which it would otherwise be difficult or impossible to secure. Masses of native trees and bushes, or individuals of either; an ancient and picturesque fruit tree; a vine-covered surface, are often of the greatest value and can be utilized to give results that could not be secured in years by artificial planting.

The site being secured, the designer must become thoroughly familiar with the nature of the ground and character of the surroundings and the requirements of the client; then, if he has the genius to make his work an artistic success, he will be able to outline clearly in his mind a picture of the completed place, which is in harmony with the character of the ground and its surroundings. His conception will be as clear as that of the artist painter. With the artist it is one thing to conceive a picture and quite another to transfer it successfully to a canvas, and so it is with the landscape architect. There must be with the power of designing, a very broad practical knowledge of methods and material available to reproduce this picture, and a skill in making plans for, and in directing work, so that the proper methods may be used and the material so combined that the desired result will be secured. With all his skill the landscape architect must often wait for years to see his picture realized, while the artist may reproduce his in days.

The success of a place depends very much upon the cordial coöperation of the building architect. By working together a result may be secured which would ofttimes be impossible, if they worked independently. Much depends upon a proper fitting of the house to the grounds,—in character, outline, and elevation,—by the architect, and a proper arrangement of roads, walks, and vegetation with reference to the house, by the landscape architect. You might as well expect two artists, one a painter of buildings and the other of landscapes, to paint pictures independently of each other on different canvases and then to trim them up and fit them together successfully. Not only should the character of the ground be considered in determining the character of the house, but also the character of the surroundings. I know of a modern cottage, constructed largely of rough bowlders with dark-stained and irregular gables and projections, all covered with a growth of vines. It is standing on an avenue surrounded on all sides by stately mansions of cut stone, brick, and wood. It reminds me

of a countryman in his old clothes at a city ball. He would be a very pleasing and picturesque object on the farm among his cattle and his help — the controlling feature of the scene — but he would look out of place among dress suits, and so did this house among its neighbors.

The character of the place having been determined by the landscape architect, or with his assistance, or it may be by the owner (for the designs of many places have been made and carried out by the owners with most satisfactory results), the location of the house, arrangement of grounds, and construction is to be considered. In these matters it is useless to attempt to establish rules, for it is seldom that two places can be treated exactly alike, even if it were desirable that they should be, and there are no two families with the same requirements. General principles may be stated that can be adapted to varying circumstances. The house will be located with reference to views, exposure, the subdivision of the ground, surrounding buildings and approaches, and this can be properly determined only by a comprehensive study of all these points. A well drained location will be secured, care being taken to avoid a site over, or in the line of, springs. In a house to be occupied in winter a warm exposure for the living room is desirable, but if to be occupied only in summer the cool side of the house should be the living side.

Convenient and comfortable approaches are more important than fine views from the windows. One soon tires of a fine view, if it is secured at the expense of a daily climb up a long hill or long flight of stairs. A fine view is to be sought for and is an invaluable possession, but it will be fully as much appreciated if reserved for occasional enjoyment from a comfortable outlook above the house site, if it is not practicable to secure it from the house and at the same time secure good approaches. In any event, the question of approach will largely govern the location of the house. Too often the landscape architect is only called in to solve the problem of how to get to the house after it is built, this important matter never having been considered up to that time, and then appearing impossible. Many times a very expensive or very awkward, and always unsatisfactory makeshift, is the only way out of the difficulty. The position of the house will depend upon the use the ground is to be put to, and care must be taken that it does not encroach upon areas required for other

purposes. An example I have in mind is that of a village lot in the centre of which a house was placed. The proprietor wanted a lawn tennis court, and could have secured it at small expense if the house had been located a few feet to one side from where it was. He had to go without it, as other parts of the ground were required for other purposes.

The subdivisions of a small or medium sized lot, outside of the approaches and yards, would ordinarily be the lawn, a flat surface for tennis or other games, which may be a part of the lawn, the flower garden, and the vegetable garden, of which the flower garden may be a part. The lawn should be the broadest piece of unbroken surface on the place; its position and size would be governed by the shape of the lot, the amount of land necessary for other purposes, the direction of the view, and the location of approaches. Ordinarily the tennis court would be located on flat land, or land that could be made so readily; on the lawn, or near it, if a grass court; if a dirt court, screened from it by planting. The flower garden should be readily accessible from the house, out of the line of an important view. Its location and character could, and probably would, be varied to suit local circumstances more than any other subdivision of the ground. The vegetable garden would naturally take up its quarters at the back of the buildings near the stable and sheds, and its relative importance would be governed by the desires and tastes of the owner. All this applies to the village lot which is all to be used for home grounds, but the same principles would apply to the home grounds which should be reserved about the farm buildings or about the house of any large estate in the country. There should be a distinct division between this, the home ground, which would be nicely kept, and the cultivated, mowed, or grazing fields of the farm. It may be a fence or wall bordered by shrubbery, to one side of which would come the lawn and on the other the farm, or it may be a retaining or ha-ha wall with the lawn sloping from the house to it, and with planting along its borders above the wall.

Roads and walks are not in themselves objects of beauty; they are essential to secure convenient and comfortable access to the buildings and parts of the grounds. To secure the least amount of road that will serve this purpose properly, and to so arrange it that it will not be too obtrusive, or cut up the broader open spaces too much, or destroy important natural features, and

at the same time secure easy grades and graceful curves is one of the most difficult problems the landscape architect has to deal with. It is in most cases decidedly better to have the main entrance to the house on the side away from the lawn. This is contrary to the general practice. The lawn should be the quiet, restful side of the house — the homeside — and should not have an avenue or turn, and the frequent coming and going of carriages and people between it and the house. A main approach direct to the entrance of the house must be provided, and branching off from this at some distance from the house, or often entirely independent of it, there should be a secondary approach to the kitchen yards and stable. The approaches should be as direct as practicable. When it is necessary to cross the lawn, the grading can often be so managed as to hide the road from the house, and give the lawn the appearance of being unbroken. Steeper grades than a rise of one foot in fifteen should be avoided in roads, and one foot in ten in walks. The curves should be gentle and be made with an evident reason. Unnecessary curves in roads or walks are always very conspicuous. For some places a straight entrance and formal treatment is preferable to curved lines and a more natural treatment. Only such walks as are required should be provided. An approach to the house independent of the drive, and walks in the gardens and to buildings are usually all that is necessary. A walk around the lawn is often unnecessary and unsightly; in wet weather it would not be used, and in dry weather the grass is pleasanter to walk upon. Roads should be wide enough for teams to pass each other, or they should be so narrow that it is evident they cannot pass, say ten feet. Twelve feet is deceptive, fourteen feet will do, but sixteen feet is better. Three teams could not pass in eighteen feet; in twenty-one they could. The width will depend upon the arrangement of roads, the amount of passing, and the character of the passing. A fashionable family with many friends and a visiting day, will need a road wide enough for coaches to pass. If roads and walks are thoroughly constructed in the beginning, on proper grades, and the water is kept off of them, much labor and expense will be saved later in repairs.

Grading, whether the changes in the natural surface are many or few, is an important matter, especially on those parts which are not to be planted. A graceful and natural fitting of the new surfaces to the old requires some skill. A gently undulating

surface and long, gentle slopes are more natural, more pleasing, and more easily cared for than short, steep slopes. In nature, abrupt slopes with sharp angles are seldom seen in free soil which is undisturbed by heavy bodies of water. Nature's process is to gradually wear off the sharp, upper edge and fill it in at the abrupt base. The result is a curve gradually running into a reverse curve — an ogee curve as the builder would call it — and it is such a curve that should be imitated in lawn grading. A formal terrace, when used, may be defined by a wall or a terrace bank. Such a bank should be distinctly formal, with its angles sharply defined and slope flat — not a mongrel with a curved top and an angular base. Very steep and abrupt slopes are sometimes necessary. They can often be filled, and held in place, with heavy, natural bowlders, and planted to imitate, so far as possible, a similar slope in nature. It is very desirable to secure a shallow turf gutter at the base of a bank sloping toward the road to prevent the water from flowing on to the gravel surface. The water can be intercepted by occasional catch basins, and carried across the road, if it is on a sidehill, or disposed of by drains.

Where a permanently vigorous and luxuriant growth of plants or a constantly fine turf is required, deep trenching or plowing and liberal fertilizing is essential. It does not follow, however, that poor or barren land cannot be covered with a pleasing growth without this thorough preparation. The luxuriant clothing of bayberry, sweet-fern, wild rose, and other plants on the sandy and gravelly soil of the exposed seashore and also inlands is sufficient evidence of this.

Drainage and the disposal of house wastes are important matters that must be considered in the plan of a place and provided for during construction. With a satisfactory fall and outlet (for which you will sometimes have to seek permission to go through your neighbor's land) the drainage of a wet surface is not difficult to secure. A satisfactory disposal of sewage is more difficult. A leaching cesspool is the usual vehicle, a very unsafe and in many soils unsatisfactory method. A tight cesspool periodically emptied is more expensive to maintain, but safer. There are safe but somewhat complicated methods of disposal by sub-surface, or surface irrigation, which can often be used to advantage. Of course, if there is a sewer the disposal is a simple matter.

Planting, which is so often looked upon as the principal work of the landscape architect, is, as I hope I have made evident, only one of the details — a very important one, it is true, but after all only the dress and ornament of the place.

There are many thousands of species and varieties of hardy plants in common cultivation in the north-eastern United States. Of woody plants alone there are between four and five thousand species and varieties that are offered in foreign and American nursery catalogues, three-fourths of which would probably survive ordinary winters at Boston under favorable circumstances. Many of these are interesting only to the botanist, and of no value to the landscape architect, but a knowledge of all that may be of value — a very large number — will enable him to produce results and secure effects that cannot possibly be secured by a man with a more limited knowledge. While the great variety that is available gives an opportunity to produce interesting details and a much longer season of flower and more interesting winter effects, it is also a great source of danger, for it constantly offers the temptation to use too large an assortment, which will result in a mixed planting with no character or individuality, and also in the introduction of many things that are not adapted to the soil or surroundings, the failure or poor success of which will give the whole planting a shabby, patchy look. It is safer to select a few reliably vigorous varieties, having good, healthy foliage through the season — they are more apt to be natives than exotics — and let them predominate in the planting; then add to its interest, if it is in a place where it is desirable to have interesting details — that is, where it frequently comes under close observation — by using a greater variety of native, exotic, or garden forms of woody plants, or hardy perennials. A large variety in a border which is to be seen from a distance is entirely lost to the eye, or gives an undesirable, mixed, or patchy look, and adds largely to the expense. If it is made mainly of a few kinds, as we see in nature, the most effective and pleasing results can be secured. A low border plantation made up of the flowering dogwood, with a few of its red flowered variety, the panicled dogwood, clethra, and wild rose, — all natives — would give a better result than the same number of exotic varieties, or if the variety were increased many times. If it were desirable to have more interesting details, large masses of loosestrife, golden rods, asters, perennial sunflowers, and the

like, would give it without detracting from the effect of the woody plants.

The use of colored foliage in a lawn planted in a natural way seldom produces a pleasing result, though I should not say that it cannot be used. To a person of refined tastes a gaudy, yellow piece of furniture in a finely furnished and decorated room, the prevailing color of which is green, would be offensive. It would mar the enjoyment one would take in a tasteful and harmonious room, for it would be impossible for him to banish this conspicuous object from his eye or his mind. But a bit of yellow ribbon or bric-a-brac in the same room could be used to draw the eye to some particularly nice feature to which this bit of color would give life and vivacity. If the same good taste that is applied to the decoration of a room be applied to the grounds, the brilliantly colored garden forms would be used less than they are now in the lawns, and be confined more to the garden. If one prefers not to have the quiet restfulness of the lawn, and cannot appreciate the refined beauty of natural shrubs with their ever varying tints of green, their graceful outlines, their wealth of flowers, their luxuriance of foliage, but prefers to make a flower and foliage garden of all his place, very gorgeous and striking combinations of color and outline can be secured with garden forms, — more striking and showy than any we ordinarily see, for there are many interesting varieties which are little known and less used. Do not understand me to disparage a garden. I think every place should have one, and that it should be made as interesting and attractive as possible, but I do not think it a good thing to spread it all over the place. A brilliant garden is as attractive as a brilliant bit of autumn landscape, but an autumn tinted landscape throughout the season would soon make one long for something green to look upon.

In the making of fine gardens and the arrangement of decorative plants, more particularly those which are used for a summer decoration, there is room for a new profession, which even now is practised, but is not distinguished from the practice of the landscape architect. It requires a thorough knowledge of this very large class of decorative plants, with the skill and taste necessary to make brilliant, yet refined and artistic, combinations, not only harmonious in themselves but harmonizing with their surroundings. Such a profession has already been called

ornamental gardening. It is not gardening in the sense of growing of plants. To have the knowledge and skill to grow the many plants and their varieties now cultivated, and at the same time to keep up with the new introductions, will tax the resources of a very active brain; there are few that can do it. Many gardeners are skilful in arranging combinations of garden plants; perhaps some of them would be more successful at ornamental gardening or designing than at gardening. It is certain that there are landscape gardeners, and probably already ornamental gardeners, who cannot successfully grow all, and perhaps can grow only a very few, of the plants they use.

There are fashions in gardens and fashions in plants, and too often a plant is considered essential because it happens to be popular. The ornamental gardener who is working for an artistic result will not hesitate to use the commonest weed, if it furnishes just the shade, texture, or form that he requires — the common burdock perhaps, or the silver weed.

The beautiful landscape of a park will never go out of fashion, and the landscape, architect in producing such, uses plants as a painter uses his pigments in painting a picture. He paints in a broad way; the minutiæ of detail of the garden and the lawn would not only be lost to the eye but would very likely defeat the very object he is working for. With him the garden standard of value counts for little. Very common plants like the willows, cat-tails, and sedges, or even the common rhubarb, may make the foundation of a picture that will challenge the admiration of the critic and even of the multitude.

There is more or less fashion displayed in the planting of a lawn; it would be better if the vagaries of fashion were confined to the garden, and that the lawn should partake more of the character of a bit of landscape, or a grassy glade, or opening in the midst of shrubbery or wood, for it is not always that the breadth of view, which makes up a landscape, can be secured in or across a lawn. It should have a beautiful fringing of green, varying in texture, color, and outline, with a frequent glow and constant sparkle of flowers, with groups and fine individuals breaking out from the bordering masses, but not interrupting the open centre of the lawn, excepting to increase the appearance of distance. You would expect to use a larger assortment in the lawn than in a distant border plantation, — more exotics and more of the garden

varieties having variations in flower,— but certain reliable varieties should predominate and establish a character for the planting which will be in keeping with the character of the place. The position of groups on the lawn will be governed by the views and by the topography of the ground. In general, elevations will be planted high and depressions low, or not at all, to increase their apparent height or depth. The planting would be arranged so that a slope would be away from it rather than toward it. A border plantation having an irregular edge with points and depressions, gives more opportunity for variety and more effects of light and shade than a straight edge. Groups and individuals would in general be used to increase the prominence of the points— not to fill up the bays. In selecting plants, the greatest care must be taken not to select too large growing kinds for the places they are to occupy. A border plantation should be an irregular mass of foliage rather than a series of distinct individuals. To produce such an effect, thick planting is usually best, for a quicker result is secured; also a more natural and graceful outline, and less care and cultivation are required. The plants will thin themselves naturally, but it is, of course, better to do a little thinning and training every year to encourage the development of interesting details, but it should be done with a definite object in view. Unless this can be done in an intelligent manner under the close direction of some one who comprehends and is in sympathy with the design, it would be safer not to have it done at all. There is no good reason for trimming shrubs, as it is ordinarily done. Surely nothing could be more ugly than the broom-headed shrubbery which is seen on many lawns, both public and private. A decoration of fagot street brooms would be about as handsome as much of it. It is neither natural nor formal. If a place is adapted to a formal treatment, and is so treated, the selection of plants to be trimmed formally would not include an indiscriminate assortment of garden shrubs, but would be made up only of those that were adapted to this treatment. Too often men who call themselves gardeners are responsible for the almost universal mutilation and misplacing of shrubs, and I believe I am safe in saying that many who are gardeners are often guilty. It would seem that the gardener's training is directed toward making successful growers of greenhouse and garden flowers and vegetables, and that there is seldom acquired anything more than a

very superficial knowledge of the commonest hardy woody plants and their treatment.

If the ground has been thoroughly prepared in the beginning and a good top-dressing is given every winter, but little further cultivation will be required after the plants have become established and have grown sufficiently to cover the ground. There is no more occasion to tear up the surface, and with it the surface roots every spring with spade or fork, than there would be to tear up the surface of a beautiful roadside thicket to keep it in good condition.

Shrubs and small trees should predominate in a small place. That very large trees cannot be used to advantage should be evident to any one giving thought to the subject, yet you will see in the majority of places large growing deciduous and evergreen trees placed so near the walks or buildings that they will in a very few years become obstructions. Broad-leafed evergreens, while more expensive, are as a rule better and more permanent for a winter effect on a small place than coniferous trees. The best plants are those which are nursery grown. Wild plants of certain varieties, if properly handled, will transplant well, and produce a good effect, but without experience in handling such plants the result is likely to be unsatisfactory. It is very difficult to get native plants of many kinds in large quantities from the nurseries, and it is in this that the landscape architect can often help to good advantage, as it is usually part of his practice to keep informed as to where such plants can be obtained.

The employment of a trained gardener on a small or medium sized place is not practicable. Men offering themselves as gardeners at day laborers' wages are more likely to bring discredit than credit to a profession that requires for success, intelligence, enthusiasm, and a true love of the work. A good gardener loves his flowers and plants next to his family, and is as impatient of neglect and bad treatment of the one as of the other. Such a man soon finds and stays in a good position with fair pay,— not as much as his skill and intelligence deserve perhaps, but in many ways preferable to other work where more dollars per day are earned. I believe it is safe to say that the majority of those who call themselves gardeners, who are drifting about and ready to accept a position at any price, are not safe men to have on a place. Their assurance is in proportion to their ignorance, and

by taking advantage of the ignorance of their employers they can do more damage to a place than the proprietor himself could, however ignorant of gardening. For this reason I believe it is safer for him to employ a willing and industrious man who lays no claim to a knowledge of gardening, but who will do as he is told, and give him directions how to do the work on the place. If errors are then made, they will only serve to increase the knowledge and interest of the proprietor.

In this writing I have had in view small or medium sized home places especially. I have hardly touched on the service the landscape architect may be to the real estate owner in planning his property to avoid steep grades and heavy cuts and fills, in preserving and developing the natural features of the place, in so arranging the lots that each may be accessible and have as nearly equal advantages as possible, and in planting to utilize the material on the grounds; to the village, town, or city in designing public recreation grounds and the surroundings of public buildings, advising with regard to street tree planting or roadside improvement; to cemeteries in designing the grounds and their decorations; to public amusement resorts in providing a convenient and pleasing arrangement of buildings and grounds, laid out in a manner to educate rather than to degrade public taste.

Some information as to the methods employed by the landscape architect, or landscape gardener, in carrying on his profession may be of service to those who contemplate employing such assistance. Some make a charge for their plan, a profit on the men employed in superintendence, and also a profit on the plants used, which they supply partly from nurseries of their own and partly by purchasing from other nurseries. There are others whose practice is the same, except that they have no nursery of their own or no personal interest in one. Others prepare plans and superintend the construction for a percentage of the cost, and still others contract for a specified sum to design, furnish all material, and construct a place. Where it is taken up as a profession purely, the practice is to make a charge for general design and report also for working drawings, estimates of cost and superintendence. Such charges are usually based on the difficulty of the undertaking rather than on the cost. On any purchases of materials that are made it is the practice to give the client the benefit of the lowest rates which frequent and often large purchases enable the landscape architect to procure.

Where a trained landscape architect is not available and the proprietor or any of his family has not the time or disposition to study into and direct the work, then the safest course would be to trust to your local florist, nurseryman, or contractor, securing from him an estimate of the cost in advance. You can hardly expect to get very artistic or original results, for the greater part of their time and thought must be given to the successful conduct of their business, of which this forms only a small department. It is very often to the local florist, nurseryman, or contractor that the landscape architect looks for his skilled assistance in carrying out the details on a place, under the direction of his trained assistants who are familiar with the plans and the results desired.

I believe the time is not far distant when the man who is to build a new place, or remodel an old one, and who wishes to secure the best and most economical result, will call in the landscape architect to help him plan the ground, as he now calls in the building architect to help him plan the building.

Discussion.

Edward L. Beard said he would like to add a word or two from his own observation, and he thought the last sentence of the paper just read would be an appropriate text. He believed most emphatically that the time has come when the landscape architect should be depended upon quite as much as, if not more than, the the building architect, in the creation of a home. The laying out and preparation of one's grounds requires the same care as the planning and decoration of the house. Twenty years ago it was different. Then the cost of the house was the only thing considered, and if any trees were introduced they were selected with little judgment and were planted promiscuously without any reference to forming a picture, or to improving the appearance of the house. Some time ago, when at Baltimore, he noticed an estate of about four hundred acres upon which stood a mansion, which probably cost at least seventy thousand dollars. But the house stood alone, with nothing done to the bare grounds to render the place attractive. Today we do not see these defects as much as formerly; taste is growing,— more, he thought in the Eastern States, perhaps, than in some other parts of the country. The work of the landscape architect is becoming more important; more thought and attention are given to the improvement of

homes. He was greatly impressed with the possibilities which the more general employment of professionals would develop. But meanwhile, when owners undertake improvements in this direction, let them look to what the ultimate result of their planting will be, when the trees and shrubs have attained their growth. There is no more valuable ally to the advancement of public taste than the landscape architect, and it is better for the owner of a place, in having it improved, to spend a little more money and have the work well done, than to have the grounds planted promiscuously.

President Kidder said we sometimes see exhibitions of singular taste in efforts at lawn decoration. As an instance he mentioned seeing a whole kitchen outfit, consisting of a range with its furniture, including pots, kettles, saucepans, etc., all in position as in use; and a plant, or collection of plants, growing in each, set out upon the lawn as a grand decoration.

Leverett M. Chase spoke of landscape gardening especially in connection with new public buildings. When such an edifice is needed, it is often the case that areas of land which may be selected as eligible for the purpose will be bonded at once by speculators, in order to secure a large profit from its sale to the public agents. By a give-and-take arrangement among themselves — and possibly a similar understanding with officials — the locality is selected where the structure can be erected. It may be a costly and showy one, but the beauty of its contour and embellishments cannot be seen, as in the selection of the ground no attention was paid to securing broad approaches, or space for lawns, or even a gravelled or paved yard. The exceptions to this rule are comparatively rare. What we need to do is to educate the people in landscape taste, not only by having elegant and costly public buildings, but by locating them in open places, surrounded by ample and tastefully arranged public grounds. Toronto, in Canada, is an instance where this principle is adopted to a larger extent than in most of the cities in the United States. With us, in nine cases out of ten, trees are not properly located; nineteen out of every twenty trees are set so near together that by their growth they soon crowd each other, and the beauty of the park or thoroughfare is destroyed.

William C. Strong expressed the great interest he felt in the subject, and said he had highly enjoyed the treatment of it by the essayist today. He believed the time is soon coming when we

shall rely mostly on the landscape architect to plan our grounds and locate our houses and other buildings, and that, too, upon small places at relatively moderate prices. There have been hitherto comparatively few — except rather large estates, or public grounds — that have been planned and arranged under the direction of professional landscape architects. The impression widely prevails that all such service is an expensive luxury in which but few can indulge. He thought it would be a great service to the public, if some of these professional men would aim to popularize their calling by brief suggestive work, applied to small places at moderate cost, leaving the labor to ordinary workmen. The advantage of employing such skilled judgment at the start, if not too expensive, would be manifest to all. He agreed with the lecturer, that in planting we should generally avoid fancy colors; also that it is very easy to be tempted to use too great variety. Nature made no mistake in providing green as the prevailing color. Still there are many exquisite shades of green, which can be combined in various ways, producing beautiful effects, none of which will be gaudy. The silvery sheen of some of the Conifers, the brilliant shades of the Japan Maples, and many other distinct colors, all have their advantages in producing the best results.

Thomas C. Thurlow thought that most books or treatises on landscape gardening are better adapted for the use of those owning extensive grounds, with abundant means, than to those with small grounds and limited means. In our manufacturing towns and villages, there are being erected every year, hundreds of houses — mostly, perhaps, built on lots of fifty by one hundred feet — and the general view appears to be that the nearer level the land is, the better. Further than that the owners do not pay the least regard to the land, or the future use to be made of it. The one idea appears to be to get the house up and ready to occupy in the shortest possible time. The sand and gravel from the cellar is often thrown out, completely covering all top soil, which should have been carefully saved, together with that from the driveway and paths. This top soil, with other loam, should be used to finish grading up around the house, in a natural easy curve, and to the depth of from one to two feet; and also upon the small plat to be used for a lawn, or for growing trees and flowers. Instead of this, however, the sand and gravel only are often used for grading up about the buildings, and other equally

worthless material is hauled in to "fill up" any inequalites on the proposed lawn and garden.

The speaker used, as an illustration, Haverhill — near which is his home — now a city of thirty thousand people, but which within his memory was known in that vicinity as Haverhill Village. There were over two hundred and fifty houses built there during the past season, many of them of considerable pretension, planned by competent architects, and generally painted in the most approved modern style. And yet it is doubtful whether any one of their projectors ever consulted a landscape gardener. If a couple of hours' advice costing about ten dollars, or a simple plan of the grounds, for twenty-five dollars, could have been obtained from a competent person, many, no doubt, would have availed themselves of the privilege. But no such person was to be found. The landscape architects of our day do not apparently care for these small jobs.

Formerly, when shade trees were needed for the streets of this town, some New Hampshire farmer was engaged to dig maples and elms from his pasture or woodland, and the usual price of one dollar each was paid for tree and planting — the planting oftentimes done much the same as you would set a telegraph pole or hitching post — and if the "Committee" were sharp enough to get such work done for fifty or seventy-five cents per tree, it was considered a "smart" transaction. The speaker suggested that it might be a good plan for this Society to offer a premium for the best small treatise upon the A B C of landscape gardening and landscape architecture, and thus promote the knowledge — and the more general application — of this beautiful art.

O. B. Hadwen had been much interested in the subject of the essay, and considered that its treatment was in the right direction. He had known for some time the importance of this subject, and especially in its application to farms, a point upon which he noticed the lecturer had not touched. The most of the land in this State is occupied as farms; but farmers, as a rule know little or nothing of landscape beauty. They are taught to cut down trees, but not to plant them, nor to reserve and protect them. Hence our farm scenery has suffered generally, and has rarely been improved by the owners. He said it did him good to see the large stately trees that have been left standing by some sagacious men, when cutting off a crop of wood; also well

developed trees that have been planted for ornament long years since. He also admired the beauty of some recently introduced trees such as Schwedler's and Reitenbach's Norway maples, with their rich colors, changing from spring through the summer and to the end of autumn; also coniferous trees which are darker colored above and lighter beneath; or with blue, or sage colored foliage, like *Picea pungens*, the peculiar color of which is due to cultivation. Manuring changes the color of *Pinus pungens;* and having learned this fact, the farmer must see to it that his trees are highly manured to develop their beauty.

The Chairman of the Committee on Discussion announced that on the next Saturday, "A Historical Sketch of English Horticulture" would be given by Samuel Henshaw, of West New Brighton, Staten Island, N. Y.

BUSINESS MEETING.

SATURDAY, January 28, 1893.

An adjourned meeting of the Society was holden at eleven o'clock, the President, NATHANIEL T. KIDDER, in the chair.

The Secretary moved that the Finance Committee be added to the Executive Committee for the consideration of that part of the President's Address relating to the Building and the Library. The motion was unanimously carried.

Adjourned to Saturday, February 4.

MEETING FOR DISCUSSION.

HISTORICAL SKETCH OF ENGLISH HORTICULTURE.

BY SAMUEL HENSHAW, West New Brighton, Staten Island, N. Y.

The subject given to me by your Society is one to which justice cannot be done in one short essay, but which would require a series of papers, or even a volume to give an intelligent outline of what has been done in our profession, even in the last two centuries. But, as I interpret it, the subject calls for a historical retrospect,

and a comparison of what it is today, with horticulture in the most remote period of English History. Consequently, I am compelled to begin at the beginning, and take a glance at the records we have of anything pertaining to horticulture in the British Islands from the earliest periods.

We are entirely in the dark regarding the cultivation of either fruits or flowers previous to the Roman occupation of England. There are some vague hints by the early historians of the cultivation of certain vegetables and fruits by the aboriginal inhabitants, but nothing that we can place any reliance on until about the year 80, when Julius Agricola invaded England, although one writer says the grape vine was introduced about the year 10 of our era. However, we do know that when once the Romans had obtained a footing on those Islands it was not long before they introduced and taught the cultivation of all the known desirable fruits and vegetables of that period, especially as many of the fruits and vegetables grew to greater perfection in the climate of England than they could possibly be made to do in Italy. The currant, gooseberry, raspberry, and strawberry are natives of Britain. From the evidence we have that the rich Roman families were in the habit of spending their summers in England, to escape the heated term of their native clime, it is but natural that they would be anxious to surround themselves there, with all that contributed to their comfort and enjoyment, both socially and otherwise. We have abundant evidence, from recent discoveries made in various parts of England, that the "four hundred" of that period, selected some of the most favored parts of the Island for the gratification of their luxurious and refined tastes. There may still be seen the remains of their villa residences at Bath, Chester, Cheltenham, and various other places, where there were either mineral springs, mountain air, or the social life incident to the security afforded by a walled city, which meant "a colony of summer visitors," and all which that expression means today in a similar gathering of our own times. When one examines the elaborate and ornate decorations that have been lately exhumed at Bath, Chester, and other summer resorts of the wealthy Romans in England; the mosaic pavements leading to their baths, the partly covered courts, and other provision made for the thorough enjoyment of a summer retreat, it appears improbable that a colony of such rich and aristocratic people would be willing to

forego, even for a brief period, all the accessories of a luxurious life, to which they were so accustomed in their winter homes that they had become necessities to them.

The recent discoveries at Herculaneum and Pompeii reveal to us the people who made up the transitory population of the fashionable resorts of those times, for, as far as any comparison has been made, the architecture, decorations, and general design were very similar, subject of course to the modifications required by the difference of climate.

Again, they were contemporary, and living under the same government; having abundance of wealth to gratify all their luxurious tastes; having for slaves a conquered people to do their bidding; with all the southern and middle portion of the Island held as a colonial part of the Roman Empire for a period of four hundred years, so that there was ample time to introduce and acclimatize any of the fruits, flowers, and vegetables they might desire for their own use, and to exchange for the produce of other climes. We may take it for granted that the apple, pear, cherry, plum, and many of the native small fruits would be grown and improved by them. We know little about the flowers of that period, but the paintings on their walls, to be seen in many of the once buried cities, represent palms and other plants as household decorations; jars of preserved fruits, and other evidence of a highly civilized people, tell us that this branch of horticulture was not neglected by them.

The abandonment of England as a Roman Colony, necessarily brought about a state of things unfavorable to the progress of horticulture. History is almost silent on this subject for a long period, but we have abundant evidence that the work begun by the Romans was not entirely lost sight of or abandoned. Neither did all the colonists accustomed to the culture and improvement of the various fruits and flowers, leave England when their rulers did; but some continued their residence and the cultivation of vegetables, fruits, and flowers for their own use and profit.

The Saxon period was an improvement on the preceding two or three centuries, and we begin to have some little record of what was being done in the line of horticulture. Some of the early traditions of the time speak of some of the old-fashioned flowers, and the use made of them; for instance rosemary was carried by the mourners at the funerals of their friends, and that custom is

still kept up in many parts of England. Herbs of various kinds were used to flavor different dishes, and honey was made into a fermented drink called mead, indicating that bees were kept and cared for at that period.

But the Doomsday Book brings us face to face with facts that show plainly the taste and thrift of the common people of England in the eleventh century. In it is a record of all the homesteads in the country at the time of the Norman invasion; how many cattle they owned, and their value; what crops they grew, and a minute outline of the daily life of the people at that period. In the unsettled times following, and for several centuries, the pursuit of horticulture was mainly followed by the inmates of the various religious houses, and the gardens of the monasteries and abbeys were resorted to, both for pleasure and profit, for besides growing the various fruits, vegetables, and herbs for their own use, the country people in the immediate neighborhood came in for a share of the good things, which were freely given if asked for. The old gardens attached to these abbeys may still be seen in various parts of England. Among those I have seen I will mention Tintern Abbey, Furness Abbey, Kenilworth Abbey, Fountains Abbey, and Glastonbury Abbey, and there were many others. Historians of that period tell us that the monks of Glastonbury made their own wine, cider, and perry, clearly indicating that the grape, apple, pear, and other fruits were largely grown.

The early poets such as Chaucer, Spenser, and others give us many glimpses of the various flowers and fruits in their season at that time. Shakespeare makes frequent mention in his plays of the different flowers and fruits of his time.

The old laws of primogeniture, however objectionable they may have been politically and socially, have been of great benefit to the horticultural world, for they have been the means of preserving to us intact some of the best examples of horticulture to be found in the world today; and where the owners of those old estates had any taste for improving them, the heirs would continue to embellish and beautify the ancestral homes. They now often show samples of the present styles of gardening side by side with those in vogue centuries ago. In some of these quaint old "Grandmothers' Gardens" may still be found the flowers and fruits that were prized for their perfume, their old associations, and their value as medicines. Sweet herbs always occupy a prominent

place in these gardens, for, in many of the old homes, the grandmother with her stock of dried herbs, and a knowledge of their virtues, was often the only doctor thought of. Some of us have a lively recollection of the bitter and pungent doses these old ladies could compound from these same innocent looking herbs. Gerard's "Herbal," published in 1597, is in a great measure responsible for those old-time doses.

The old gardens at Berkley Castle — said to be the oldest inhabited house in England — are well worth a visit. They are kept much in the same style as they were in the fifteenth century. Yew and box are still cut and trimmed into the most quaint and grotesque shapes imaginable, and the sun dial occupies a prominent position. There were plenty of York and Lancaster roses, eglantine, lavender, rosemary, and other sweet-scented shrubs of great age, and single hollyhocks, wallflowers and clove pinks in abundance. Haddon Hall, in Derbyshire, is another old place, with a garden planted in the style fashionable during Queen Elizabeth's reign. The gardens around the Bishop's palace in Wells, are even more quaint, for the whole of the grounds is surrounded by a moat filled with water, with portcullis and drawbridge. The lawn in this garden is one of the oldest in England, and has not been disturbed for centuries, yet the grass feels and looks like velvet.

Horticulture does not appear to have made much progress during the Wars of the Roses and the Commonwealth. But after the country again settled down, and England began to colonize her foreign possessions, a great impetus was given to all branches of horticulture.

Lord Clive had conquered India, and for doing so received a severe reprimand from the British Government; but England has held on to it for all that, and today considers India one of her most valuable possessions. That country has yielded many treasures to horticulture.

The American colonies, founded originally for commercial purposes, gave fresh zest to the discovery and cultivation of many plants entirely new to the Old World. Nothing was known, previous to that time, of the potato, tobacco, maize, and Lima beans. Among flowers it was the home of the dahlia, poinsettia, verbena, and many other plants only found on the Western Continent. The establishment of Kew Gardens formed a nucleus and

a home for the development and propagation of anything new in the way of plants from any part of the world, and from this source some of the best and most useful products of nature have had their starting point under cultivation, and by that means have been disseminated to private places in England, and to the trade in general.

The sending out of collectors to unexplored regions, both by the government and private individuals, has added largely to the list of useful and ornamental plants. Amongst some of the most distinguished and practical men of the last century who have been the means of adding to the list of new plants are Sir Joseph Banks and Dr. Solander (who accompanied Captain Cook in his voyage around the world), Bartram, Siebold, Humboldt, Linnæus, and Parkinson.

Another great help to the dissemination of a knowledge of horticulture was the publishing of various works on the subject, and up to the middle of this century the writings of such authors as Abercrombie, Sweet, Evelyn, Parkinson, Kent, Lord Bacon, and other contemporary authorities were largely copied. Some of their directions for the culture of fruits and flowers were quaint and minute, intermixed with much solid sense and close observation. One of these old writers advises that manure should be used with great caution, as it might have a tendency to impart a disagreeable flavor to the crops. Others give very particular instructions about sowing and planting at the time of a growing moon, warning their readers that the result would be much better than if sown at the time of the waning moon.

The London Horticultural Society, with its exhibitions, experimental grounds, and its published "Transactions," has been a great help in bringing before the public anything new, and the awarding of certificates of merit to those enthusiasts who were fortunate enough to raise and bring to its notice any improved form of fruit, flower, or vegetable, has assisted in this work.

The establishment of an Experimental Garden at Chiswick, also gave new and valuable aid, particularly to fruit growing, for if any doubt was raised about the merit or other characteristic of any new introduction, it could at once be decided by comparison with the growing plants. This experimental garden has also been the headquarters for establishing and maintaining a correct nomenclature of all the fruits worthy of cultivation; and when in charge of Robert Thompson was looked upon as an infallible authority.

The common people of Britain, from time immemorial, have taken a great interest in everything that added to the beauty and comfort of their homes; the old saying that "an Englishman's house is his castle" has proved to be true, time and again in history. The fondness of the people for detached homes, surrounded or approached by a garden, seems inborn, for when compelled to live in towns where a garden is impossible, tracts of land in the immediate suburbs are rented and divided up into separate gardens. Often there is no fence between the different owners, but a mutual interest serves to keep off all intruders.

A spirit of rivalry exists among them as to who can raise the best crops, and when a cottager takes any particular fruit, flower, or vegetable in hand as a hobby, he is bound to show something creditable, even when cultivating it under the most adverse circumstances. This spirit of emulation is kept up, in a great measure, by the almost universal practice of holding periodical shows in all parts of the country. At these cottagers' shows may be seen the products of their little gardens, brought together for competition. Some of the more enthusiastic growers will travel many miles previous to the time of holding their own show, just to keep posted on what their rivals are doing, and to learn how the pet specimens of others compare with their own products.

The Lancashire Gooseberry Growers' shows are known all over the country, and the amount of time, labor, and enthusiasm the growers are willing to bestow on their favorite sorts is astonishing. Then they are constantly trying to raise new varieties from seeds of an unusually fine berry. These are watched like babies until they come into bearing, and if one shows any superiority over any of the old sorts in its class, great secrecy is practised to keep it from the eyes of rival growers. When the fruit intended for exhibition is approaching ripeness, there is great anxiety felt, for too much moisture is liable to burst the fruit and disqualify it for exhibition purposes. The first prizes were usually a copper kettle or a silver tea-pot, and when a boy I knew a boat builder, who had won so many that the ceiling of his living room was hung full of these trophies, each engraved with the name of the fruit, and when and where won. It was remarkable that some of the most successful growers were those who followed an entirely different calling for their daily bread — weavers, colliers, carpenters, and men of other trades, all had their favorite fruit or flower. Tulips were

much grown, but always of the late or show kinds. Such kinds as Greigi, Gesneriana, Parrot, or any of the double forms were not grown for prize-taking. Each grower had his own seedlings coming along, and when we remember that it takes seven years to fix the colors in a seedling tulip, we can see that there was a large stock of patience required to await the result. Carnations, picotees, auriculas, pansies, wallflowers, and many other old-fashioned flowers, seldom seen now, were grown, and many of the improved forms of these flowers seen today owe their development to these amateur growers. Many of these cottagers' exhibits were equal if not superior to any that a professional gardener produced. On a recent visit to England, I saw in the markets of Manchester, Bristol, Bath, and other places, some of the finest samples of cucumbers, mushrooms, rhubarb, grapes, and apples, as well as flowers, that were grown in these cottage gardens and their small greenhouses and frames.

I cannot close this paper without saying something about the old gardeners and the part they took in the development of horticulture in England. At the end of the last century, and up to the early part of this century the men in charge of some of the finest places in England were comparatively isolated from the rest of the world. The estates were far apart; travel at that time was slow and difficult; consequently, they were left in a great measure dependent on their own resources. This, however, gave them an opportunity to stamp their own individuality on some of the features of the estates in their care. Many of the best samples of gardening today are the work of these men. In many cases they were landscape gardener, practical gardener, and steward combined. They felt a personal interest in the improvement and good name of the estate, many of them holding their positions for a lifetime, and their sons following in their footsteps. It is not to be wondered at that much interest would be taken in the growing and development of anything they took a particular fancy to, or in carrying out any improvements suggested by their employers. I might here mention a few of the estates that have been so improved, and brought to their present high state of perfection by a long and intelligent treatment at the hands of practical gardeners. Chatsworth, the seat of the Duke of Devonshire, where the *Victoria regia* first flowered in England, and where the first greenhouse was built for the growing of aquatics;

also famous as one of the most complete and finished private places in England, was for a long time in charge of Sir Joseph Paxton, and later of a man you all knew, the late James Taplin. Another noted place is Shrubland Park, the seat of Lord Middleton, where many of the present race of geraniums, and other bedding plants had their origin. Their introduction we owe to the intelligent hybridization and selection of the late Donald Beaton; amongst some of the sorts that made quite a stir at the time were Stella, Shrubland Pet, and many of the nosegay kinds.

Blenheim, the seat of the Duke of Marlborough, is a place of national reputation, and one of the best examples of landscape gardening as practised by Humphrey Repton. Here he carried out his conception of what can be done with water in this art. There is on this estate, the largest artificial lake I have ever seen. Trentham, the seat of the Duke of Sutherland, is another well-known show place, famous for the successful forcing of all kinds of fruits, together with extensive ornamental grounds.

At Ashton Court, the home of Sir Philip Smythe, I have seen finer samples of American plants than anywhere else in England. There are on this estate, plants of *Yucca gloriosa* so old that no one living on the place now, knows when they were planted. They are larger than any I have seen in either Florida, Georgia, or any other of the Southern States, and have never been protected; but they are propped up like a lot of cripples, to prevent their being broken down by their own weight. Here may also be seen fine specimens of live oaks, magnolias, and many other plants too tender to survive the winters in other parts of England; also examples of the different styles of flower garden planting in vogue two hundred years ago, and also a terrace wall with its decorations of urns and pilasters designed by Inigo Jones. At Styal, the seat of the Gregg family, may be seen all the varieties of the Rhododendron family worth growing. The successive generations of the same family have been enthusiastic in hybridizing these interesting plants, and here they find a congenial home, for they are planted in the woods, and along a ravine on the banks of the River Bollin, giving them a much more natural and pleasing effect than any artificial beds could do.

Worsley Hall, the seat of the Duke of Bridgewater, was famous for its pineapples in olden times, and is now noted for its fine collection of fruits. Here also may be seen the "Old Hall,"

where the "Father of Inland Navigation" lived. The old building is carefully kept in the quaint black and white style in vogue many centuries ago. I have heard my grandfather say that when the old duke had made a success of his canals he spent a great deal of his time in the old garden; that he was partial to the old clove carnations; that he was an inveterate snuff-taker, and in order to facilitate taking it in sufficient quantity, he had it poured into his waistcoat pocket without a box, and that he invariably took a good pinch of snuff before smelling of his pinks. The boys in the garden wondered which he smelled most, the pinks or the snuff.

At Studley Park, the seat of the Earl De Gray, nature has done a great deal for the beauty of the place, but it has also been improved from time to time by a long line of owners who have taken up and carried out the line of improvements started by their forefathers. It has also been in the hands of many of the best practical gardeners at different periods.

Many other private places might be mentioned in the British Islands where gardening is carried on to great perfection, but time will not permit enumerating them at present.

Another impetus has been given to the love of horticulture in England by the setting apart of sufficient space in or around the different towns for Public Parks. Many of these are in the midst of densely populated and smoky districts, and, as may be imagined, the satisfactory growing of flowers in such surroundings is almost impossible. But the men in charge are intelligent and enthusiastic, making very creditable displays with a very limited number of varieties of plants that will endure a smoky atmosphere. Amongst a number of parks with these unfavorable surroundings may be mentioned Stamford Park, at Ashton, near Manchester, in charge of George Lunt, who had the finest display of tulips, hyacinths, and other spring bulbs and herbaceous plants, that I have ever seen. These were followed by such bedding plants as he had found from experience would grow in such a forbidding locality. Rhododendrons and some other American plants were planted, but the beauty of their foliage was spoiled by the quantity of soot with which it was covered.

The Manchester Botanical Gardens have for a long time been presided over by my old friend, Bruce Findlay. Here have been held some of the best shows in England, and the gardens are

open to the public during the holiday season, which is "Whit Week." The prize-takers at these shows have been most of the famous horticulturists of the present century, for the liberal prizes offered brought together all the most famous collections of plants, fruits, and vegetables, and their growers.

Another great public educator, in connection with these gardens, is the space always given to the "cottagers' exhibits." These are gathered from all the surrounding country, and form one of the most interesting parts of the exhibitions.

I could make a very long list of the frequent prize-takers at these exhibitions,— men who have been in the front rank, and in their line have done much to make the many improvements in the fruits, flowers, and vegetables of today. But, as I said at the commencement of this paper, a volume might be written of the improvements that have been made since the middle of this century, but this paper I am afraid is already too long. At some future time I might say something of the noted men of our own times, who have done so much to bring about the present state of perfection we find in English horticulture.

In closing this paper, let me mention another public educator, and that is, the marked improvement in the literature connected with our profession. We all remember the monstrosities that were formerly made to represent the different fruits and flowers in the catalogues, and even the magazines of a few years ago, and the very unreliable, wordy descriptions of any new fruit, flower, or vegetable. How different they are today! You can take up the catalogues of any of the prominent seedsmen or nurserymen and read them through with a great deal of interest. In many of them the illustrations are the work of some of our best artists, the literary composition is as good as that of any of the current magazines on any subject, and some of them strive to be so accurate that they employ photographers to make all their illustrations. In fact, any of them are fit adornments for a drawing-room table. All this is not brought before the public without a great deal of expense. I remember once being in the office of the late Peter Henderson, when his spring catalogues were being brought in, and I remarked that it seemed a very expensive way of telling the public what he had to sell; his reply was, that it cost him twenty thousand dollars to get them in, and ten thousand dollars more in postage, etc., to get them out again. If

any one had been so rash as to spend that amount of money in catalogue making a few years ago, he would have become bankrupt before any return would have been made on his investment.

All this goes to show that the taste for horticulture is growing; the public read more and are getting more interested in the subject every year. In fact, I believe we are only at the beginning of the capabilities of horticulture, and its refining influence on the people of England, America, or any other country.

Discussion.

William C. Strong said he experienced a lively interest in the comparisons drawn between the earliest known efforts in horticulture, in England, with those of recent times, as they were presented by the essayist. He thought the statements made contained many good suggestions which may be useful to us. It was pleasant to learn that some good things could be named as coming down to the present generation from the iniquitous system of primogeniture. It kept an estate together and tended to preserve and continue methods of culture and treatment, which certainly were advantageous. Here, on the contrary, we as a people are changeable, and few estates remain in a family after the founder passes away. He could remember a few early estates which attained distinction because of the horticultural operations that were carried on upon them. The Cushing place at Watertown — now Belmont — was once widely known by reputation. The Lyman estate at Waltham was the home of scientific agricultural and horticultural practice. These and a few others were strong supporters of this Society in its earliest efforts to promote horticultural interests in Massachusetts. But the then owners of those estates having finished their course, the estates and the work so well begun upon them have also passed away from us. It is unfortunate for our horticulture, that we have not the class of enthusiastic gardeners of whom the lecturer has spoken. But then another difference in circumstances is that most of our well-to-do occupants of estates are too much absorbed in business affairs to take such interest in the cultivation of their home grounds as is the rule in the old world. In every other direction we, as a people, are going forward with rapid strides. It would appear that the general interest in the cultivation of crops in our

country is quite strong, since the seedsmen could not afford to spend money so freely in advertising by expensive catalogues, as stated, if they had not a sure ground for the expectation of an abundant return in trade. This Society promotes the work pretty well, considering our limited room. We must enlarge our available space before we can extend our work to good advantage. Let us be on the watch to extend our influence as our opportunities may open.

Francis H. Appleton referred to the tendency here to divide large estates into many small ones, as spoken of by the essayist. This lessens the demand for plans involving large areas and more than a generation of time to carry them out. His work on the Gypsy Moth Committee of the Board of Agriculture, had called him into neighborhoods composed of many small holdings, and it is interesting to see how much can be and has been made of such; surprising results are sometimes found to be possible. Many cases exist that are object lessons for good. There are many instances where residents, by pleasant, health-giving, personal effort, might introduce new attractions and thereby secure a great deal more enjoyment of home than they now realize can be made possible. Another influence against home improvement is that, as a rule, our people are so unstable; many families change their place of residence frequently. Business so entirely occupies the attention of others as to exclude all thoughts of home culture and embellishment. As the essayist spoke of the work commenced so long ago and kept up ever since on the great English estates, it excited the thought that it behooves us to see how much can be done to improve the small places into which the land is divided in our own country.

Mr. Appleton said he had been much pleased with the essay, and had enjoyed it highly, and he moved a vote of thanks to Mr. Henshaw for his very interesting paper. The motion was unanimously carried.

Mr. Henshaw in response to the vote of thanks tendered to him for his essay, said that he at first hesitated to appear before a Boston audience, especially one whose members were more or less familiar with his subject. But he was now glad he did not yield to that prompting, and he sincerely thanked the audience for the kind attention which had been given to his paper.

O. B. Hadwen announced that the subject of the lecture on the next Saturday would be "The Progress of Horticultural Societies;" to be delivered by Hon. Henry L. Parker, President of the Worcester County Horticultural Society.

BUSINESS MEETING.

SATURDAY, February 4, 1893.

An adjourned meeting of the Society was holden at eleven o'clock, the President, NATHANIEL T. KIDDER, in the chair.

Charles E. Richardson, Treasurer and Superintendent of the Building, read his Annual Report for the year 1892, which was accepted, adopted, and referred to the Committee on Publication.

The Secretary read a letter from Annie E. Robbins, Secretary of the Middlesex-Worcester Pomona Grange, No. 3, Patrons of Husbandry, communicating a unanimous vote of the Grange, endorsing the action of the Massachusetts Horticultural Society in its methods recommended for the extermination of caterpillars.

On motion of E. H. Hitchings, the President appointed the following Committee on Window Gardening:

Mrs. H. L. T. Wolcott, *Chairman*,

E. H. Hitchings,	Henry L. Clapp,
George E. Davenport,	George A. Parker,
Mrs. P. D. Richards,	William E. C. Rich.

On motion of William C. Strong, it was voted that a Committee of three be appointed by the Chair, to consider the arrangement of the Business Meetings and Meetings for Discussion, so that they shall not interfere with each other.

The Chair stated that he would announce the Committee at the next meeting.

On motion of Francis H. Appleton, it was voted that the same Committee consider the expediency of providing additional ballot boxes; and that they be authorized to procure not exceeding six if they deem it expedient.

The following named persons, having been recommended by the Executive Committee as members of the Society, were on ballot duly elected:

ROBERT KENT JAMES, of Dorchester,
LAWRENCE COTTER, of Dorchester,
AMOS M. LEONARD, of Boston,
SAMUEL J. TREPESS, of Brookline,
Mrs. R. JOSEPHINE COBB, of Attleborough.

Adjourned to Saturday, February 11.

MEETING FOR DISCUSSION.

THE ECONOMICS OF HORTICULTURE.

By Hon. HENRY L. PARKER, President of the Worcester County Horticultural Society, Worcester.

It seems to be a popular impression that the "Hortus" is a plaything of the rich; that the science of Horticulture means costly lawns and pleasure grounds, ferneries and arboretums, green-houses for exotics collected from every clime, plants and flowers to gratify a love of the beautiful, and tropical fruits which only the epicurean taste of the wealthy can afford; in short, that Horticulture is a recreation and a "fad"— a luxury for the favored few.

But there never was a greater mistake. This noble science has a utilitarian as well as an æsthetic side, and as a factor in political economy it may be doubted whether any other has played a more important part. It has been called the "handmaid of agriculture." It is more than that; it is its mentor and guide — its inspiration. It has given to agriculture new methods, and directed it into new channels. It has by constant experiment and long-continued investigation developed from a natural state and brought into general use, new species of fruits, new edible plants, new species of vegetables, and taught the best methods of their cultivation. It has collected grasses, fibrous plants, fodder plants, resin, gum, and rubber-bearing trees, grown them, tested them by exhaustive experiment, and distributed those which have proved of value to every quarter of the globe.

The increased quantities of food for man and beast produced by these means, the materials of commerce thus multiplied, and the

employment thus furnished to countless multitudes, have laid the foundation of the national prosperity of many countries.

The science of Horticulture is also the auxiliary of the other sciences. In the propagation of medicinal plants and the production of new medicinal agencies, it has proved of invaluable service to the medical profession.

Vegetable physiology has been in many respects the pioneer of animal physiology. For example, the doctrine of the cellular animal tissue originated in and was based upon botanical investigation which led to the discovery of the plant cell.

The cellular structure of plants was first pointed out and elaborated to some extent by Robert Hooke and others in the seventeenth century. In 1833, Robert Brown discovered the nucleus in plant cells. Five years later, Schleiden, the eminent German botanist, pointed out the *formation* of cells in plants, and laid the basis for the now universally accepted cell doctrine. These generalizations, which Schleiden had made with reference to plants and plant cells, were afterwards extended by Schwann, the physiologist, to animals and animal cells.

Certain drugs of vegetable origin — like morphine, strychnine, atropine, and veratrine — have become of the utmost importance, if not indispensable, in physiological investigations. It is perhaps safe to say that certain lines of physiological experimentation would not have been possible without *curare*, the celebrated South American arrow poison, from the juice of the *Strychnos toxifera*, the peculiar action of which is to completely paralyze the motor nerves.

These results in horticulture and in vegetable physiology have been obtained for the most part by the founding and support of horticultural societies, botanic gardens, and arboretums, with their adjuncts, greenhouses and forcing beds, herbariums, experimental grounds, museums, pineries, palm-houses, their schools of botany, and schools of practical gardening, their museums and laboratories, their collection, and facilities for the collection, of seeds, plants, and trees, from every clime and every nation.

And it is only at such an institution, equipped with all these accessories and appliances, that the science of Horticulture can be most profitably and diligently pursued. And such an institution, thus equipped, affords the opportunity for researches which may prove of inestimable value to mankind.

The best illustration of such an institution is the Botanic Garden at Kew, — or, speaking more correctly, the Royal Gardens of Kew, — on the banks of the Thames. These stand at the head of all similar establishments in the world. They constitute the centre around which, not only the horticultural and botanical science of England revolves, but of the whole continent as well, and, for that matter, of the whole civilized world. It is universally acknowledged to be the most complete organization of its kind in existence.

The great work of Kew, however (although Kew is one of the oldest of such institutions now in existence), has been accomplished principally within the past half century, and since it came within governmental control.

The pioneer work was done by the Horticultural Society of London, among the moving spirits of which were its first active President, Thomas Andrew Knight, F. R. S., and Dr. Lindley, Assistant Secretary, who contributed many valuable papers to its "Transactions." This institution was organized in 1804 and incorporated in 1809, and was the first society of any note, in Europe or America, to collect and classify plants and trees under the Linnæan system.

Mr. Knight, in one of his first addresses relating to the objects of the association, speaks of the then primeval condition of horticultural science. It is interesting and instructive to compare the picture he presents with the magnificent results that have since been obtained. He says:

"We possess no sources from which sufficient information can be derived to direct us in our enquiries as to how to trace out the various changes which art or accident has, in successive generations, produced in each of the vegetables which now occupy the attention of the gardener and agriculturist; and are still ignorant of the native country, and existence in a wild state, of some of the most important of our plants. We know that improved flowers and fruits are the necessary product of improved culture; yet few experiments have been made, the object of which has been new productions of this sort; and almost every ameliorated variety of fruit appears to have been the offspring of accident or of culture applied to other purposes. Societies for the improvement of domestic animals, and of agriculture in all its branches, have been established with success. Horticulture alone appears to have been neglected, and left to the common gardener, who generally pursues the dull routine of his predecessor."

This was uttered since this century began; since then the common gardener has been transformed into the accomplished botanist and man of science; while the practice of his art has blessed mankind and changed the face of nature.

In 1820 this Society began the construction and maintenance of an experimental garden at Chiswick, a few miles from London proper, also on the banks of the Thames.

From this date, for a period of twenty years, more or less, the Chiswick Gardens became — what the gardens at Kew became later — the centre of horticultural and botanical knowledge. Expeditions were organized and sent from it to the four quarters of the globe, for the collection of plants and seeds. In 1824 these gardens contained the most complete collection of fruit and hardy trees then existing in England or any other country. The work of the experimental garden (while floriculture received its due share of attention) was of a most intensely practical nature. For the carrying on of this work, the grounds were supplied with every conceivable structure and appliance necessary and needful,— tanks, cold frames, melon pits, forcing beds, an herbarium, a library, etc. Buildings were erected for the botanical and other scientific work attempted and accomplished. Annual reports, of great economic value, were prepared and published, showing the results obtained.

Among the active members and those carrying on investigations were men of the highest scientific attainments — Fellows of the Royal Society of London, Fellows of the Linnean Society — and the results of their experience and investigations were also published by the Society.

In 1840, however, Kew, which had been languishing for want of support, was subsidized by the English Government. The gardens, which before were the property of the Crown, were surrendered, and became from that date a national establishment. And as Kew went up, Chiswick went down. The eminent Sir William Jackson Hooker was appointed Director, and under his efficient management Kew advanced in usefulness and importance by leaps and bounds.

There was great difficulty, however, for many years — owing to the feeling, to which I have already alluded, that the institution was a sort of plaything for the wealthier classes — in obtaining the necessary appropriations from Parliament. And the struggles of Director Hooker for many years in obtaining these appropriations

were both interesting and amusing. Members of the House of Commons would rise in their places and enquire with great gravity and earnestness, Why this paternalism? *Cui bono?* What is all this worth? Why should the government support mere pleasure grounds for the benefit of idle loungers? All this should be left to those æsthetic individuals, gorged with riches, who like such things and have no better use for their wealth. This should be made a private affair. The Government should place its appropriations where they will do the most good and meet with a fitting return.

But as year after year went by and the beneficent work of this institution became more and more apparent, these utilitarians were silenced. They were beaten at their own game. It was demonstrated beyond cavil, that the Gardens of Kew were a paying investment, and were making large contributions to the national wealth and prosperity. They stand today upon a firm and well established basis. They have become an institution in which the nation takes great pride. They are the parents of fifty other institutions of a like character, in England and her colonies, and he would be a rash man indeed who would dare oppose any reasonable appropriation for their benefit.

The limits of this paper will not allow me to state in detail all the work this institution has accomplished in the line of economics. I can only generalize.

There is, first, the Museum of Economic Botany, established about 1847, and which occupies three buildings. Here is represented, so far as known, every useful plant and tree the world contains, with a representation, so far as possible, of the manner of its use.

From the Museum of Timber, cabinet makers, builders, architects, and furniture manufacturers gather information of great value in their respective vocations.

The Herbarium is the largest and most useful in the world. The number of specimens it contains was estimated many years ago at over one million, and more than twenty thousand are added annually.

Vegetable diseases and insect pests receive attention, and remedial agencies are provided with which to contend against them.

The distribution of seeds and living plants from Kew, has been enormous. They have been sent out to meet the demands for

government plantations in the colonies and elsewhere, such as mahogany seed sent to the East Indies and to Mauritius and the seed of the Liberian coffee, which, being of a robust habit, will thrive in hot and moist situations where the Arabian variety is unable to live. This variety was developed at Kew from seed sent there for investigation and experiment. It proved so prolific and hardy that it was sent to take the place of that grown in the East Indies, which was affected by a fungoid pest, and that of the West Indies, which was devastated by the white fly. It is now being grown with uniform success in most of the coffee-growing countries of the world,— at the Bahamas, Barbadoes, Bermuda, Calcutta, Ceylon, Dominica, Jamaica, Java, Mauritius, Montserrat, Natal, New Granada, and Rio de Janeiro.

One of the most important achievements at Kew was the introduction of the cinchona or Peruvian bark tree into India and the other colonies of Great Britain.

Some forty years ago great alarm was felt at the high price of quinine, produced at that time entirely from the cinchona trees on the western coasts of South America. It was feared that the supply was becoming exhausted, and for several years attempts were made to procure plants and seeds and start plantations in Southern India. The Dutch Government moved first in the matter and planted them in Java, but they proved to be of a worthless species, the enterprise proved a failure, and the plantations were rooted out. The British Government attempted the same thing, importing plants direct to India, which died on the passage. Finally, in 1859, an agent was sent from Kew to Peru, to select seeds and young trees. These were sent to the experimental gardens of Kew, where they were planted, fed, and nursed. The enterprise proved successful, and the plants, after attaining sufficient vigor, were transmitted, first to India, where plantations were started, and later to Ceylon, Jamaica, St. Helena, Trinidad, Cape of Good Hope, Queensland, and many other places. In the plantations at Bengal there are at least 5,000,000 trees. The plantations at Ceylon are nearly as large, and the sum realized from the sale of quinine, manufactured or produced from these trees, amounts to several millions annually. Aside from its value as an article of commerce, the importance of this drug to the inhabitants of semi-tropical and malarious countries, as a medicinal agent, can hardly be over-estimated.

Another triumph for Kew was the introduction, into the same countries, of the culture of ipecacuanha, which, as a specific for the dysentery, has a value and importance hardly less than that of cinchona itself.

So, also, Kew has been instrumental in the introduction of rubber-bearing trees into the colonies of Great Britain. In short, there is no plant, which has yet been discovered, valuable for clothing, or as a food, or as a medicine, or for the supply of any want of man, to which the resources of Kew have not been devoted. In only one particular can Kew be said to take a position inferior to that of any institution of a similar character, and that particular feature is its arboretum. It must be gratifying to Americans, and to Bostonians, of all Americans, that a British Journal — and that journal so English a sheet as the "Saturday Review" — should make this admission: — "The Arboretum is the richest in Europe, no doubt, but probably inferior to that of Harvard University, where special attention has been paid to this department." The failure of the Kew Arboretum to fulfil expectations, is doubtless due to a shallow, sandy soil resting upon a bed of gravel.

Not the least important feature of Kew is its literary work. Three valuable periodicals are issued monthly: the "Botanical Magazine," edited by Sir Joseph Hooker; "Icones Plantarum," which periodical deals with dried or colorless specimens of plants, and the "Bulletin of Miscellaneous Information." A number of special pamphlets are also published, from time to time, treating of fresh discoveries, and sent to the colonial governors, to museums, and to prominent scientific men everywhere.

I have said that Kew was the parent of other similar institutions. One of the largest and most important of these, is the Adelaide Botanical Garden, in South Australia. This garden was founded in 1855, and is situated on the banks of the river Torrens, which divides the city of Adelaide. It included at first only forty acres. The whole garden now comprises one hundred and forty acres. A Museum of Economic Botany has been constructed, and a Botanical Garden planted. The cost of its maintenance is about $20,000 a year. It includes a Pinery, Arboretum, Conservatory, and Fernery, and is, in its appliances and plan of work in most respects, a copy of Kew. Its experimental grounds comprise about fifty acres of rich chocolate-

colored loam. The utility of the establishment of this garden can hardly be over-estimated. It has largely served the practical wants of the province by experiments in cultivation, and by the distribution of plants and seeds. Vines have been imported from France, and their usefulness in Australia tested. Guinea grass (*Panicum giganteum*) has been proved well adapted to local culture.

Through the agency of Kew and the Adelaide Garden a most valuable fodder-plant, called the sheep bush (*Pentzia virgata*), has been introduced from the Cape of Good Hope into South Australia. Seed was sent from Kew to the Adelaide Garden in 1869. In a report of the work of the garden, this description of the plant is given:—"The leaves and branches contain an aromatic bitterness, which is liked very much by sheep, and which gives the mutton a fine, peculiar flavor." The plant is easily propagated by cuttings, of which every one will grow if planted when the first rains begin to fall.

Other important gardens in the old world, are those at Singapore, in Southern India, and at Buitenzorg, Java, the latter being under the auspices of the Dutch Government. A tourist gives this pen-picture of the Buitenzorg garden, showing that its management is largely in the direction of economics:—"I visited that part of the garden used in the experimental cultivation of shrubs and trees useful in a commercial point of view. One large area was devoted to specimens of the coffee plant, with its laurel-like leaves of a healthy, dark green. There was the pepper tree, with its insignificant leaf; caoutchouc trees I saw, of two or three species, with their leaves and bark full of the precious sap. Much ground was used in the cultivation of divers sorts of tobacco. Cotton, also, was growing here in plenty; so was opium. Cinnamon trees, like vast overgrown laurels, very odoriferous at a certain season, were not wanting. The compactly growing nutmeg tree, hungry of manure and requiring incessant care, was well represented. Cloves and arrow-root; sugar and tea, are produced in these gardens. There is an acre or two of the smooth cactus, which is very valuable on account of the bug—*Coccus cacti*—which generates and lives upon it. This parasitical insect, at a certain season, is brushed off the leaves, and when dried becomes the cochineal, so famous for dyeing." Of course the experience gained by this experimental gardening is carefully diffused over Java.

In this country, the pioneer work in horticultural science was done by Horticultural Societies, of which the Massachusetts was among the first and most important. These were followed later by Botanical Gardens and Arboretums, conspicuous among which are the Arnold Arboretum and the gardens at Washington and St. Louis. Experimental stations have also been established in most of the states, under the auspices of the National Government, where important botanical work is done.

I have spoken of the intimate connection between horticultural or botanical science and the other sciences, and have said that investigations and discoveries in vegetable physiology have led to some of the most important and valuable discoveries in animal physiology. Let me illustrate farther what possibilities for the future lie in this direction.

In the Palm house at Kew,— a picture of tropical beauty, perhaps as perfect as can be found outside the original jungle, and which no one would for a moment suspect contained a utilitarian suggestion — in this Palm house may be found a recently discovered plant (*Gymnema sylvestre*), from the leaves of which an alkaloid can be abstracted, which, taken upon the tongue or into the mouth, deprives one of the sense of taste for forty-eight hours without injurious effects. Side by side with this may be found another plant, called the Miraculous Berry of the Gold Coast, the leaves of which, treated in the same manner, produce a totally different effect, for the decoction cloys the mouth with a saccharine sweetness so great that it matters not what we eat or drink afterwards — it will always have, during the time the effect lasts, the flavor of honey.

If, as the long-continued operation of these drugs would seem to indicate, they have a central, rather than local, effect upon the organ of taste, what is more probable than that a series of experiments with these plants may yet lead to the discovery of the cortical centre of that organ of taste, which has never yet been anything more than hypothetically located.

But some one may ask, Of what use is such a discovery except to add one more scientific fact to the sum of human knowledge? We cannot tell. We do know this, that is is not safe to assume that the discovery of any simple fact in science may not be of great benefit to the world, when so many of such discoveries (not deemed, perhaps, of great importance at the time) used, as they

have been, in the line of other investigations, have been followed by momentous results.

But great as have been the strides of Horticulture in the direction of Economics during the past half century, as the result of experimental study and botanical research its possibilities are still almost infinite.

Professor George L. Goodale, in a very recent address before the American Society for the Advancement of Science, in speaking upon this topic, says that out of 110,000 flowering plants known to botanical science, only about one per cent — a fraction less than one per cent — is utilized by man; and that of the flowerless plants the percentage is much lower; that what is needed is that the promising plants should be systematically investigated under exhaustive conditions. It is not enough that an enthusiast here, or an amateur there, should give a plant a trial under imperfectly understood conditions, and then report success or failure. The work should be thorough and every question answered categorically, so that we might be placed in full possession of all the facts relating to the object experimented upon. To do this, he continues, requires the coöperation of many agencies; Botanical Gardens amply endowed for research; Museums and Laboratories of Economic Botany. We need institutions like those at Kew in England, and at Buitenzorg in Java, which keep in close touch with all the world. The founding of an establishment on a scale of magnitude commensurate with the greatness and needs of our country, is an undertaking which waits for some one of our wealthy men. We need experimental stations; and lastly the coöperation of all who are interested in scientific matters.

A "wealthy man" such as Professor Goodale desired was found at St. Louis, in the person of Henry Shaw. Henry Shaw was a business man of great industry and application — a man of simple tastes and a great lover of nature. He had amassed a large fortune at the early age of forty years, when he retired from business and devoted himself, for the remainder of a long life, to his trees, plants, and flowers. He laid out a garden and planted an arboretum, which, when planting and laying out, he seems to have intended for the purposes to which they were afterwards devoted.

As early as March, 1859, he was authorized and empowered by an Act of the General Assembly of the State of Missouri, to convey certain real and personal estate to trustees, for the purpose of establishing and maintaining a botanical garden. He did not make this conveyance in his lifetime, but devised by his will, executed January 26, 1885, almost his entire estate, real and personal, to trustees named therein, for a botanical garden, a museum, and a library connected therewith, and devoted to the science of botany, horticulture, and allied objects. Mr. Shaw died in 1889, and the Missouri Botanical Garden is now in successful operation, as the result of his bounty.

The appraised value of the property is $3,000,000, yielding in 1890, a net income of $50,000. A large amount of the estate consists of unimproved real estate, lying in the outskirts of the city of St. Louis, which is destined sometime to become of enormous value. This will make it, in the words of Professor Trelease, its Director, "the best endowed institution of the kind, which has ever existed, and will make St. Louis the botanical centre of the new world, and will draw to it students from every quarter of the globe."

Six scholarships have been founded, by means of which successful candidates may, for six years — during the period from fourteen to twenty years of age — receive instruction in economic botany, entomology, and such land surveying and book-keeping as is necessary for the management of gardens and large estates. Furthermore, the instruction is in practical, as well as theoretical gardening; and one qualification of every applicant is to be always insisted on, viz: a taste for the manual labor of gardening.

I have attempted, thus briefly, to demonstrate the utilitarian side of the science of Horticulture, and to show the position it occupies in Economics. The moral remains, or — as Jack Bunsby would say — the bearing of these observations lies in the application of them.

Since the science of Horticulture occupies so important a position in political economy, it becomes a question for Horticultural Societies, *per se* — Societies like the Massachusetts and Worcester County for example —, to consider whether they have not a duty unfulfilled in this regard, and whether the trust imposed upon them, to advance this noble science, is fully executed simply by

the expenditure of their annual income in the distribution of prizes. It is true, there is a certain stage in education when the object lesson is desirable if not necessary; but are they not clinging too long and too closely to kindergarten methods? Should they not initiate some form or method of botanical investigation, or, like their pioneer, the Royal Horticultural Society, plant an experimental garden? Of course the natural reply is, expenditure must be measured by income — limited means will not permit such outlay. We must continue to revolve in the same circle until extraneous aid shall reach us from some source — perhaps from the advent of Professor Goodale's "wealthy man."

But if a beginning were only made in however humble a way, and good results shown, would not the extraneous aid more surely come? And what forbids the Commonwealth, which from time immemorial has taken agriculture under its protection, which has drawn annually so many thousands of dollars from its treasury for the destruction of insect pests, for sanitary purposes, for experimentation in sewage disposal, for a thousand things from which no return could ever be expected — what forbids the Commonwealth from lending to these societies its fostering care, when it can so easily be demonstated that every dollar thus spent will prove a paying investment?

Better still would be a recognition from the general government. And just as the many smaller societies in England and her colonies — of which Kew has been the foster-mother — have been given life, and been enabled to follow in a more modest way, the methods of Kew, through the governmental aid afforded her, so might our own government, by giving an institution like the Missouri Botanic Garden at St. Louis a national character and by making that institution a steward and dispenser of its bounty to other institutions of a like character, become the means of eventually bringing all the horticultural societies of the country in touch with St. Louis as a centre and in touch with each other.

The value and importance of such governmental aid to the science of horticulture would lie, not so much in the annual or periodic appropriations for its benefit, as in the prestige that would arise from such a connection with the government. St. Louis would then become our national Kew. All our military and naval officers, all our missionaries to foreign lands, would become so many agents for its enrichment. All our exploring and

scientific expeditions would contain their corps of botanists, charged with the duty of adding to its treasures, by the discovery of new plants and flora. And from the treasures thus collected at our national centre, there might be such a dissemination to societies of a kindred nature, throughout the land, as to make the work beneficent, beyond conception, "for the relief of man's estate."

These are practical questions which I do not assume to answer. I make these crude suggestions and submit them with the topic under discussion for your consideration.

Discussion.

Rev. Charles S. Harrison of Franklin, Nebraska, connected with one of the state experiment stations, said he had been a home missionary in the great west for a third of a century, and had also endeavored to be a missionary along horticultural lines. He believed the evangel of nature should be proclaimed with the evangel of grace. The wealth of the great west was in the fertility of the soil, and in the brains of the farmer. The west, like many portions of the east, needs a higher rural development. He was much impressed with a visit he made to the farm of Webster at Marshfield, and wished we had the brains of a Webster for every one hundred and sixty acres of land. Then what marvellous results would be attained. For his part he had fifteen acres under high cultivation at Franklin, Nebraska. He was trying to see what would thrive there. He had thousands of choice evergreen trees and shrubs, and farmers would go over his place in utter astonishment, not knowing that such a transformation was possible. He told them he had no patent on this thing; that what he had, they could have just as well. He spoke of two men in Colorado — one, a gaunt, ragged looking man, with a wife to match, and a team which looked like the couple that rode behind them. They were all in a dilapidated condition. The man was cursing the country and the climate and his neighbors; he was all awry with God and man and nature. A little way from him was Jesse Frasier, who went into that country a poor man also, but was now raising $10,000 worth of apples a year. The difference was entirely in the heart and brains of the two men.

Mr. Harrison often told the people of the newer west that in the air and light and earth, all around and beneath them, there were

millions on millions of bushels of luscious fruits; that what they needed was to plant fruit trees, on which all this wealth could gather. He was so much impressed with the possibilities of the great plains, that for years he had been experimenting with Rocky Mountain evergreens. Mr. Fernow, Chief of the Division of Forestry at Washington, visited him. He said he was almost discouraged in the attempt to find an evergreen for the plains. Mr. Harrison took him out to a grove of *Pinus ponderosa*, which he had purposely neglected, — in a place so dry that some years no water could reach the roots; yet these trees had made a foot a year in growth. "There," said he, "is the future sawlog of the plains." Unfortunately *P. ponderosa* is not a success in the east, while *P. Douglassii*, *P. Engelmanni*, and *P. concolor* do remarkably well. He thought that somewhere in the west, perhaps not far from St. Louis, the government should establish a grand Arboretum — to cover at least one township of thirty-six square miles — where the different forms of landscape planting could be shown, and the different kinds of fruits and trees could be tested. Then, at no distant day, there should be another Arboretum for the north and one for the south. He thought that this Massachusetts Horticultural Society, as the mother of kindred societies in the United States, should take the lead in this matter, and use all possible diligence to secure so desirable an object. Our nation is great and rich, and the cost would be light compared with other enterprises which do not show a tithe of the results this would ensure.

Leverett M. Chase believed that our country possesses every variety of soil and climate, and that with the proper application of skill in cultivation, we can grow any and everything. But he wanted very much to see one more crop successfully raised — one which can be produced on farms and nowhere else, and that is a crop of noble men and noble women.

Mr. Chase then moved a vote of thanks to Mr. Parker for his able and very interesting lecture.

William C. Strong rose to second the motion of Mr. Chase, and added that the idea of establishing an experimental garden had engaged the minds of the leaders of this Society from its organization. The matter came up again when the improvement of the Back Bay lands began. Some thought that available space might be secured there; but before any definite plan could be decided

upon the opportunity passed by. We are occupying too expensive a home for our work, and yet have too little room.

Francis H. Appleton felt extremely indebted to Mr. Parker for the valuable suggestions which show what can be done by members of the Society who have the disposition. He thought every member should consider seriously whether the Society is using its means to the greatest and best advantage, by keeping them locked up in this land and building. If it shall become possible in the future to add experimental gardening to our work, or to join, in any practical way, with an established garden, he thought it only reasonable to believe that the Commonwealth might be disposed to entrust funds to the Society — whose objects and evident purposes were to be progressive — to directly promote the public good by practical effort to develop horticultural science.

Benjamin P. Ware spoke especially of the suggestions of the close and intimate relation of horticulture to agriculture. He doubted whether it is generally known how much the community is indebted to this Society for improved and new varieties of vegetables, and for the number of improved fruits and flowers we now enjoy. The original experiments in cross-fertilization by Marshall P. Wilder produced wonderful Camellias and Azaleas. Essex farmers caught the inspiration, and Buxton's Danvers Onion and the Intermediate Carrot, were the first results produced. The Stonemason Cabbage — which is a standard variety the world over — also the Deep Head, and the Improved Savoy Cabbages; the Hubbard, the Essex Hybrid, the Marblehead, and the Improved Turban Squashes; the Essex Tomato, and many other standard varieties of vegetables have been put upon the market by Essex County growers. Not only in Essex County, but in other localities, the farmers and market gardeners have been and are constantly making advances along the line of better quality and character of most varieties of fruits and vegetables. Agriculture is greatly indebted to horticultural experiment and enterprise,— far more so than is generally supposed.

The vote of thanks moved by Mr. Chase was unanimously adopted.

O. B. Hadwen, Chairman of the Committee on Discussion, announced for the next Saturday, a lecture on "Fungi — the Latest Discoveries Relating to their Connection with Horticul-

ture," by B. T. Galloway, Chief of the Division of Vegetable Pathology, United States Department of Agriculture, Washington, D. C. This lecture is delivered on the John Lewis Russell foundation.

BUSINESS MEETING.

SATURDAY, February 11, 1893.

An adjourned meeting of the Society was holden at eleven o'clock, the President, NATHANIEL T. KIDDER in the chair.

The President announced the Committee to consider the arrangement of the business meetings and meetings for discussion so as not to interfere with each other, as follows: William C. Strong, Francis H. Appleton, and William H. Spooner.

It was voted that, agreeably to the rules of the State Board of Agriculture, three prizes, of ten dollars, eight dollars, and six dollars, be offered for the best reports of Awarding Committees, and that the Committee on Publication and Discussion be requested to award the same.

Adjourned to Saturday, February 18.

MEETING FOR DISCUSSION.

COMBATING THE FUNGOUS DISEASES OF PLANTS: PROGRESS OF THE WORK IN THE UNITED STATES.

BY B. T. GALLOWAY, Chief of the Division of Vegetable Pathology, United States Department of Agriculture, Washington, D. C.

[This Lecture was delivered on the JOHN LEWIS RUSSELL foundation.]

It is my purpose to lay before you today the present condition of our knowledge concerning the most approved methods of combating some of the important fungous diseases of plants. The nature of fungi and the manner in which they produce the various diseases we call blights, mildews, rots, etc., are already generally known to you; consequently it hardly seems necessary to go over this ground again. Doubtless the question of greatest importance to all growers of fruits, flowers, and vegetables, is,

How can such crops be protected from the ravages of fungi in the most economical and practical manner? This question I shall try to answer, but before taking up the matter in detail it would perhaps be well to clearly define the limitation of our discussion.

For convenience the diseases with which we are especially concerned may be divided into two classes, viz. (1), those recuring year after year independently of climatic or other conditions, and (2), those whose prevalence and destructiveness depend more or less on the weather, the soil, and other surroundings. Examples of the first class may be found in black-rot of the grape; leaf-blight of the pear, quince, cherry, and plum; black-spot of the rose, etc. To the second class may be referred such diseases as downy mildew of the grape, potato rot, downy mildew and rot of lettuce, and numerous others which I need not mention here. Of course it must be understood that no sharp line of distinction can be drawn between these classes, since what in one section may properly belong to the first, may in another be referred with equal propriety to the second, and *vice versa*.

It is obvious that the maladies belonging to the first class are more easily combated than those of the second; first, because they appear every season at about the same time, and second, because their progress is more or less regular; therefore, when certain phases in their development occur it is known what to expect. In diseases dependent on climatic and other similar conditions there is an element of uncertainty that often completely baffles the horticulturist. Not knowing what to expect he seldom prepares for anything; consequently before he is aware of it his crops are destroyed.

In the matter of treatment practically the same methods are followed in each class, the only difference being that it is possible in one instance to obtain good results by following certain rules, while in the other success depends largely on the exercise of proper judgment in connection with the rules given. A careful study of the weather, the soil, and other conditions which influence plant growth will in many cases enable the intelligent fruit grower to cope as successfully with one class of diseases as another.

In a study of the weather the daily maps issued under the direction of the United States Department of Agriculture in many of the large cities will be of the greatest service. A striking example of the use to which these maps may be put is to be found in the vicinity

of this city, where acres are devoted to the forcing of lettuce under glass. It is well known that lettuce grown in this way is subject to several diseases which almost invariably manifest themselves under certain partially known conditions of moisture and heat. Every lettuce grower is aware that during the short winter days constant care as regards watering and ventilating is necessary to keep the plants free from rot, mildew, and burn. In all of this work it would be of the greatest service to know when to expect good or bad weather. For example, the sun may be shining brightly, with no indication whatever of cloudy weather; water is applied and immediately it turns cloudy and cold, remaining so for perhaps a week or more. The top soil, under these conditions, does not dry out and as a result rot sets in, and in a very short time the whole crop may be destroyed or rendered worthless. If the cloudy weather could have been foreseen, water might have been withheld and in such a case the plants might have passed through the unfavorable conditions in good shape. By the aid of the maps a gardener, with his knowledge of local meteorological conditions derived from long and continuous observations, might without difficulty have determined from ten to twenty-four hours in advance the coming of just such weather as we have here described. The forecasts, telegraphed over the country and published in the daily papers and elsewhere, are so brief that they do not enable the horticulturist to exercise his judgment at all. With a map before him, however, he has a bird's-eye view of the situation. He sees approaching, a storm area covering thousands of square miles. He can tell pretty accurately how fast this storm is traveling, and can therefore, with a reasonable degree of certainty, predict when its influence will be felt in his region. Further, he can usually tell whether the disturbance will bring rain or snow, much wind or little wind, and the direction from which the latter will blow. All this a few years ago would have seemed incredible, and yet it is possible at the present time for any one who has access to the bulletins issued, and who will use his knowledge of local meteorology to the best advantage, to correctly forecast all the foregoing conditions, at least eighty times out of a hundred. I have dwelt upon this matter at some length because it seems to me an important one, there being nothing so intimately associated with horticulture in all its phases as the weather. This is especially the case with

plant diseases, and yet, despite the importance of the matter, very little is definitely known in regard to the direct relationship existing between plant maladies and weather conditions. A long series of observations will be necessary to establish these relations, and when this is accomplished it may even be possible to predict accurately for some time in advance when a certain disease is likely to appear. This of course will be a great step in advance of our present methods so far as treatment is concerned, and will practically place all diseases on the same footing.

Having now pointed out the differences existing between the two classes of plant diseases, let us consider the methods that may be adopted in preventing them. I shall leave out of consideration entirely methods of culture, taking it for granted that every fruit grower, market gardener, and florist will, in this respect, give his plants the very best treatment possible. Having done this he may rest assured that for the prevention of some diseases his work will be less difficult, while for others his cares and labors will not be lessened at all. You will observe that the word prevent is used in all cases. Few, if any, of the diseases with which we are concerned can be cured, which at once shows how radically different our treatments must be from the ordinary methods pursued in fighting insects. As in the case of the latter, however, when this work was begun, attention was immediately turned to the use of preparations in the form of powders and liquids, which when applied to the plants would protect them from the attacks of their parasitic fungous foes. On its face the problem does not seem like a difficult one, yet when it is looked into carefully it will be seen that the obstacles to be overcome are exceedingly numerous. It was important to find substances that would destroy or render incapable of growth the spores or reproductive bodies of fungi without injuring the plant to which these substances were applied. Further, it was necessary to determine when to apply the substances, how to apply them, and, finally, to ascertain their effects on the crop from a hygienic stand-point. The general results of this work will now be given, it being understood, of course, that perfection has not been reached in any branch of the subject.

Turning our attention first to the preparations employed as fungicides, it may be said that fully a hundred liquids and powders have been used in this country alone for work of this

kind. For work out of doors the powders were soon discarded, as it was found that they were all too easily removed by rain, wind, and dew. The liquids, consisting of various compounds of copper, iron, zinc, etc., were tried with varying degrees of success. Some were found to be of no value whatever; others so seriously injured the plants that their use was abandoned. Several seemed to be efficient fungicides, but owing to the fact that they were easily removed or were too expensive, it was necessary to discontinue their use. Strange as it may seem there is but one preparation that has stood the test of every trial, and it may be placed today at the head of all other fungicides. I refer to the Bordeaux mixture, which is fast becoming almost a household word among the fruit growers of the country. There are preparations cheaper, more easily applied, and possessing greater wetting power* than the fungicide mentioned, but they either lack in efficiency or prove injurious when applied continuously. Bordeaux mixture, as most of you are aware, is made by adding milk of lime to a solution of bluestone or sulphate of copper. The original formula called for 16 pounds of copper sulphate and 30 pounds of lime to 22 gallons of water. These amounts have been reduced, from time to time, until now we use almost entirely, a mixture containing 8 pounds of copper sulphate and 6 pounds of lime to 50 gallons of water. The copper sulphate, which may be obtained in granular form at wholesale at 4 cents per pound, is dissolved in 7 or 8 gallons of water, a 50-gallon barrel being used for the purpose. The lime is slaked in a separate vessel and after thinning to the consistency of whitewash it is poured into the barrel containing the copper sulphate solution and the two liquids are thoroughly mixed, after which enough water is added to fill the barrel. It only remains now to strain the mixture, when it is ready for use. The last operation is frequently omitted entirely, but it certainly saves time in the end to strain out the bits of lime, sticks, and straws, which clog the nozzle and give trouble in other ways. Our custom is to strain through a gunny sack tied over the head of a barrel, the latter having been made perfectly clean by rinsing with water. Frequently

* By wetting power is meant, in this connection, the property liquids possess of spreading evenly over any surface with which they may come in contact. It is something more than mere adhesiveness, for a liquid may possess this quality to a high degree and yet roll up in drops when it strikes a leaf. The drops adhere, but the leaf is not wet at all except in limited areas.

when lime of poor quality is used there is some free copper sulphate present in the mixture, and if such is the case tender foliage is likely to be injured. It is very seldom, however, that anything of this kind happens, but to be on the safe side it is best to test the mixture for free copper sulphate before using. This may be done very quickly and easily by adding to the mixture a few drops of a solution of potassium ferrocyanide or yellow prussiate of potash. If there be the least trace of free copper sulphate present a brick-red color is noticed as soon as the potassium ferrocyanide solution is added. If the mixture has been properly made there is no change whatever in color. An ounce of the potassium ferrocyanide dissolved in 4 ounces of water will answer for testing a hundred barrels of the mixture. Four ounces of the solution having the strength indicated should not cost more than 10 or 15 cents. Paying 4 cents per pound for copper sulphate and from 15 to 20 cents per bushel for lime, Bordeaux mixture prepared in accordance with the foregoing formula will not cost over 1 cent per gallon.

Only one other fungicide is worthy of mention here and that is the ammoniacal solution of copper carbonate. It is made by dissolving 5 ounces of copper carbonate in 3 pints of strong ammonia and then diluting with water to 50 gallons. Before adding the ammonia it is best to stir up the copper carbonate in sufficient water to form a thin paste. If the quantity of ammonia indicated does not produce a clear solution more should be added until this is brought about. The chief points in favor of this fungicide are, (1) ease of preparation and application, (2) cheapness, and (3) the property it possesses of not discoloring the parts of the plants to which it is applied. On the other hand the strongest objection to its extended use is that it sometimes injures the plants upon which it is sprayed. Grapes, for example, sprayed an entire season with it may in all probability be entirely free from disease due to fungous attacks, yet as a rule they do not appear healthy, the leaves in many cases being small and yellow and the wood more or less imperfectly matured. Careful experiments have demonstrated that these appearances are due to the continuous action of the solution on the tender growing parts of the plant. It is frequently more noticeable the second year than the first and is of course much more plainly marked on certain plants and certain varieties than others. It is believed that at

times the solution can be used to advantage without fear of injury to the plants. This matter, however, will be more fully discussed as we proceed.

Having now given you the present condition of our knowledge with respect to the most serviceable fungicides, your attention is called to the second phase of our subject, *i. e.*, when and how to apply these preparations. In a lecture of this kind it is of course impracticable to describe in detail the methods that should be followed in treating each particular disease. The matter can only be considered in a somewhat general way, such information being given as will enable those interested to obtain a clear insight into the nature of the work. As to the proper time for spraying no rigid rules can be laid down. It must be understood that the whole object of the work, as already stated, is prevention; therefore the great importance of doing everything in time can not be too strongly urged. A grape, for example, no sooner puts forth its leaves than the spores of the black rot fungus are ready to infect them. The same is true of the berries as soon as they form; therefore, to protect both leaves and berries it is necessary to begin spraying at least a week or ten days before the fungus usually appears. Experience has shown that this period coincides quite closely with the time when the leaves are one third grown; consequently we recommend in all of our publications that the first treatment be made as near as possible to the date mentioned. In ten or twelve days the vines will have made sufficient growth to require a second application, and so the work is continued until five or six treatments in all have been made. Practically this plan is followed in all of our work, the number of applications and the times at which they are made varying with the different crops.*

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*DIRECTIONS FOR TREATING SEVERAL IMPORTANT PLANT DISEASES.

APPLE BITTER ROT, *Glœosporium fructigenum* Berk.

Remove from the trees and destroy during the winter or early spring all shriveled apples. Spray with Bordeaux mixture, first when the fruit is the size of marbles, again in two weeks, and a third time a month later. The rotten apples that fall to the ground during the growing season should be collected and fed to the hogs or destroyed. The cost of the treatment for ordinary-sized trees will be about 10 to 15 cents each.

APPLE LEAF SPOT, *Phyllosticta, Phoma, etc.*

Spraying with Bordeaux mixture the same as for bitter rot will usually hold this disease in check. It would probably be well, however, to allow only two weeks to elapse between the time of the second and third sprayings. If the season is rainy a fourth spraying should be made three weeks after the third.

Bordeaux mixture is the principal fungicide used and it can be recommended unqualifiedly for all the diseases with which we are especially concerned. In certain cases, as for example the treatment of black rot of the grape, the cost of the work can be materially decreased by using both Bordeaux mixture and ammoniacal solution. The former should be applied two or three times in the early part of the season while the latter may be used for the later applications. Treatments carried out in accordance with this plan rarely injure the most tender plants; moreover they have the special advantage of not spotting or otherwise disfiguring the fruit at a time when such disfigurement is likely to decrease its market value.

Probably one of the most important questions in connection with the work under consideration is the manner in which the fungicides are applied. Every precaution should be taken in preparing the mixtures, solutions, etc. They may be applied at just the right time, and yet unless the work be properly done, in nine cases out of ten failure will result. When we first began to apply fungicides there were no machines entirely suited to the work. In many cases old brooms, wisps of straw, watering cans, syringes, and

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APPLE POWDERY MILDEW, *Podosphæra oxyacanthæ* (DC.) D By.

This disease is troublesome only in the nursery, where it is especially injurious to seedlings. Spray with ammoniacal solution of copper carbonate; first when the leaves begin to unfold and thereafter at intervals of two weeks until five or six treatments in all have been made. Endeavor to make about four sprayings before budding the stocks and two after this operation has been performed. The cost of six treatments, using proper machinery, should not exceed 6 or 8 cents per thousand trees.

APPLE SCAB, *Fusicladium dendriticum* (Wallr.) Fckl.

Spray with Bordeaux mixture; first, just as the flower buds begin to open; second when the petals of the flowers are falling, and third when the fruit is the size of peas or slightly larger. If the season be rainy a fourth treatment should be given ten or twelve days after the third. Four ounces of Paris green added to each 50 gallons of the mixture at the time of the third spraying will hold the codling moth in check. The Paris green should first be made into a thin paste by adding a little water. This paste readily unites with the mixture and does not seem to decrease its value in any way. The cost of the work as here described will range from 4 to 5 cents per tree for each application.

CHERRY LEAF BLIGHT, *Cylindrosporium padi* Karst.

In the nursery, spray with Bordeaux mixture; first when the leaves are about one third grown. In two weeks spray again, following with a third application fifteen days later. Adopting this plan, three sprayings will be made before budding, after which two more applications at intervals of two or three weeks should be given. In the orchard, four or five applications of the Bordeaux mixture should be made, beginning when the leaves first appear and repeating at

various other contrivances were used as a means of distributing the preparations, the result being in many cases imperfect work and consequent lack of success in holding the diseases in check. It should be borne in mind that to be effective a fungicide must be applied in such a manner that all parts of the plant exposed to the attacks of the fungus are thoroughly protected. In other words the ideal in this matter is attained when the preparation applied forms an even film over the entire surface of the leaf, fruit, or other part of the plant it is intended to protect. For many reasons it is difficult to attain the ideal, yet it may safely be put down that, other things being equal, the more finely the liquid is divided as it is thrown upon the plant the more evenly will it be distributed. To break up the liquid into a mist-like spray requires a specially constructed nozzle and a good strong force-pump. The nozzle in addition to being durable, inexpensive, and simple in construction, must be provided with some means of quickly removing any obstruction that may lodge in the necessarily small orifice through which the liquid is forced. All these requirements are found in the Vermorel nozzle, which has from time to

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intervals of two weeks to twenty days. The cost of treating unbudded nursery stock usually averages from 20 to 25 cents per thousand trees. The second year the cost will be slightly more as the buds will make more growth than the stocks. The third year's treatment will average from 30 to 35 cents per thousand trees. In the orchard full-bearing trees may be sprayed as described above, at a cost of from 12 to 15 cents each.

CHERRY ROT, *Monilia fructigena* Pers.

This has proved a difficult disease to treat. It causes the greatest loss in rainy seasons, appearing suddenly and destroying great quantities of fruit just about the time the ripening process begins. Some benefit has resulted from the use of Bordeaux mixture, applied every six or eight days, beginning twelve or fifteen days before the cherries ripen. It has proved very difficult to make the mixture stick to the fruit and doubtless this is the chief reason why the rot has not been more readily prevented. As a means of increasing the wetting power of the mixture it is suggested that two or three bars of Ivory soap be added to each 50 gallons of mixture. The soap should be first shaved up and melted in about a gallon of water. Add the melted soap to the Bordeaux mixture and stir thoroughly in order to effect a perfect union.

GRAPE BLACK ROT, *Guignardia bidwellii* (Ellis) V. & R.

Spray with Bordeaux mixture; first, when the buds begin to open. Spray again when the leaves are one third grown, and a third time when the vines are in full bloom. After this apply the fungicide every ten or twelve days until the first sign of ripening fruit; then discontinue all treatments. Good results will follow the use of Bordeaux mixture for the first three sprayings and ammoniacal solution of copper carbonate for the others. The course of treatment first described will cost about 2½ cents per vine; using the combined fungicides the cost will be reduced to 2 cents per vine.

time been improved until now it is well nigh perfect. The style of pump to be used depends somewhat on the nature of the work in view. For an all round apparatus, involving work on moderately low-growing crops, such as dwarf pears, grapes, raspberries, blackberries, strawberries, potatoes, etc., we have found nothing better than the knapsack form of sprayer. If there are twenty-five or thirty acres of such crops to treat, however, it will pay to use horse power machines. These are now on the market in various styles, ranging in price from $50 to $75. Some of these machines are automatic, *i. e.*, force the liquids through the nozzle or nozzles by means of pumps operated by specially constructed gearing. As a rule we have not found this style of apparatus very satisfactory, as it offers little opportunity to properly control the spray. It is, moreover, expensive, and being necessarily complicated is apt to get out of order. The most satisfactory apparatus we have used for general work is a simple one, which may readily be constructed at home. It consists of a barrel, mounted head up, on either light truck wheels or a sled made of heavy, durable timber. In case wheels are used the barrel should be swung between them so that its bottom will rest about eight inches from the ground. Barrels mounted in this way and designed to be drawn either by hand or horse-power may be obtained from almost any seedsman. Having procured and

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GRAPE DOWNY MILDEW, *Plasmopara viticola* (B. & C.) Berl. & De Toni.

Spray with Bordeaux mixture; first soon after the berries are formed. Make a second application of the same preparation in twelve or fifteen days, followed by others at similar intervals until the fruit begins to ripen. In regions where both black rot and downy mildew prevail the treatment for the former will hold the latter in check.

PEAR LEAF BLIGHT; CRACKING AND SPOTTING OF THE FRUIT, *Entomosporium maculatum* Lev.

In the nursery spray with Bordeaux mixture as recommended for cherry leaf blight. For combating the fungus in the orchard, where it causes the premature fall of the leaves, and the cracking and spotting of the fruit, spray first with the Bordeaux mixture about the time the flower petals fall, make a second spraying ten days later, and follow after two weeks with a third. The cost of treating full-grown standard trees as recommended will average from 10 to 14 cents per tree. Dwarf trees may be treated for about one third less.

PEAR SCAB, *Fusicladium dendriticum* (Wallr.) Fckl.

For this disease, follow the directions laid down for apple scab.

QUINCE LEAF BLIGHT AND FRUIT SPOT, *Entomosporium maculatum* Lev.

Treat the same as pear leaf blight. The cost will average about 10 cents per tree.

mounted the barrel, the next important step is to attach a good, strong, durable, double-acting force-pump, provided with two lines of discharge hose, each about twenty feet long. Fasten the pump by means of wood screws to the head of the barrel, as near the edge as possible. The suction pipe should extend to within an inch of the bottom of the barrel and should have upon its free end a coarse strainer. For filling the barrel an opening six inches long and four inches wide should be made in the head. Some means of closing the opening should be provided, but this is a matter so simple in its nature that it is hardly necessary to say anything further about it. With the attachment of a nozzle to the free end of each hose the outfit is complete. A machine made in accordance with the foregoing plan will cost from $20 to $25, and will require for orchard work a horse and two men to manipulate it. When used in the vineyard, however, or in spraying low-growing crops a horse and one man are sufficient to operate it.

As an indication of what can be done with the various machines mentioned, it may be said that in vineyard work one man with a knapsack pump can spray from four to five acres a day. With an automatic horse power machine operated by two men, from seventeen to twenty acres a day can be sprayed. With the barrel apparatus drawn by one horse and operated by two men, ten acres may be counted a fair day's work.

Having now reviewed the various questions connected with fungicides let us turn our attention to a matter which of late has attracted more or less attention in the horticultural world, viz., the relation of spraying to the public health. We are all willing to admit, of course, that copper in any form is not a desirable food. While we are willing to admit this, some of us are not prepared to accept the published statements to the effect that it is to be classed with the virulent poisons. I may say without entering upon any lengthy discussion of the matter, that all the evidence goes to show that fruit properly sprayed with the Bordeaux mixture and other fungicides containing copper is entirely harmless. This statement, it must be borne in mind, is not based upon theoretical grounds or presumptive evidence. It is founded on carefully made chemical analyses and field experiments extending over a period of three years. Granting even that this evidence is faulty we have a much stronger refutation of the statement as to the danger of this work in the

mere fact that thousands upon thousands of fruit growers the country over are spraying every year with fungicides, and as yet not a single authenticated case of poisoning from eating fruit thus treated has been brought to our attention.

In conclusion I wish to call attention once more to the importance of doing everything at the proper time and in the proper manner. Success in this as in everything else comes only after careful work and rigid attention to details. Study the subject thoroughly in the field and library, and I am sure that every moment thus expended will be amply repaid in better crops, better prices, and, what is more important, the satisfaction of knowing that you have made a good fight for what is rightfully your own and have succeeded.

At the conclusion of the lecture, Mr. Galloway gave additional remarks on weather maps. He stated that the maps were issued twice a day at Washington, being prepared from data collected at nearly one hundred and sixty stations in the United States and Canada. At these stations observations were made daily at 8 a. m. and 8 p. m., 75th meridian time. In making the observations it was noted whether the weather was clear, cloudy, snowy, or rainy. The temperature, barometric pressure, direction, and velocity of the wind, etc., were also determined, and as soon as possible all of this information was telegraphed to Washington. From Washington the data were sent to various commercial centers, where maps were also prepared and distributed for general information. He next displayed a series of maps made at Washington and extending from December 6 to December 12, inclusive. These maps showed the general path of a storm over the country. Originating in the extreme Northwest or Southwest the storms pass easterly at the rate of from twenty-five to thirty-five miles an hour. Thus the track may be easily followed and the disturbance noted fully thirty-six hours before it arrives.

The lecturer then exhibited many photographic views of fields, vineyards, and orchards, located in various parts of the country, each showing treated and untreated plants. The striking contrasts gave conclusive evidence of the advantage of using fungicides. One prune orchard in California was, in part, treated for leaf rust and with success. The portion that was not sprayed was attacked and the foliage all fell off before midsummer. One case was where black rot of the grape prevailed. The portion treated

ripened its fruit while the untreated portion was wholly worthless. Some other photographs showed knapsack pumps and larger apparatus for use in spraying, some of the pictures being views of these machines in operation. Several kinds of nozzles were also shown. Mr. Galloway said that each had its advantages and that all would serve the purpose if properly used. He spoke in praise of the Vermorel nozzle, saying that one must rely on an instrument that could be readily cleared of obstructions.

Discussion.

Samuel Hartwell asked how much of the Bordeaux mixture was required to properly spray a vine or tree during a season.

Mr. Galloway replied that for grape vines five or six years old 1 gallon per vine would answer for the season. For a dwarf pear tree it required from 1 to 2 gallons for each treatment, and for an apple tree twice this amount of liquid was necessary. Of course the amount of liquid used would depend on the size of the tree, the kind of machine used, and the experience of the operator.

Benjamin P. Ware inquired how long after mixing the Bordeaux mixture could be safely used?

Mr. Galloway answered that Bordeaux mixture should not be used after having stood a week or more. It is always best to have the mixture perfectly fresh.

In answer to an inquiry from a lady as to how many diseases had been successfully treated, Mr. Galloway said the question was a difficult one to answer off-hand. This work had been in progress only a few years, but he thought that in that time more than a hundred plant maladies had been brought under the control of the horticulturist.

In reply to a question by E. W. Wood as to the possibility of checking lettuce diseases by spraying; also as to the effect of sub-irrigation on lettuce diseases, Mr. Galloway said that the whole question of lettuce diseases was exceedingly complicated. Spraying he thought was undesirable; moreover from the very nature of the crop he did not believe it would ever prove of much value. The prevention of lettuce diseases, or in other words the growing of a good crop of this vegetable under glass, must be accomplished by rigid attention to methods of culture. Heat, light, moisture, and soil must all be watched with the greatest care. Good crops, almost entirely free from disease, were being grown every day,

but the men who grew them could hardly give the reasons for their success. There are not enough data on the question of sub-irrigation to warrant any conclusions as regards its effects in preventing rot and other diseases of lettuce.

Mr. Ware suggested on the ground of economy of storage space and expense, that special carriages for conveying the spraying mixtures in quantity, are wholly unnecessary. He found a common express wagon more satisfactory. The barrel containing the liquid could be set in it just as well. In spraying a field of potatoes, the horse would pass between two rows, the wheels would reach outside of the same two rows, and the spraying would cover four rows each side of the wagon as well as those two rows, making ten rows at each crossing of the field. In spraying trees the wagon, being higher than the special carriages, brought the operator nearer to the work; this was an advantage, as the finer the spray the shorter the distance the mixture can be thrown. He considered the express wagon better than any other vehicle in all field work in this line. Another thing he would mention; as Paris green settles quickly, he added to the apparatus a small branch-pipe leading directly from the pump into the barrel and reaching nearly to the bottom, thus keeping its contents thoroughly stirred up all the time the pump is being worked.

Mr. Galloway regarded Mr. Ware's suggestion as a good one. He stated that many large orchardists and vineyardists spray their crops in this way.

In reply to Mr. Wood, who inquired about rust on pinks and also about black knot of the plum, Mr. Galloway could give no information as to any method of treating black knot successfully. Kerosene emulsion had been used, but he doubted its efficacy as a preventive or cure. Regarding pink rust, no results as to remedies had been reached.

Francis H. Appleton asked whether the New York law in regard to the destruction of plum trees affected with black knot is enforced, and if so what had been the result.

Mr. Galloway said that he did not think the law was generally enforced. In some sections an effort was being made to carry it out, but on the whole he thought very little attention was paid to it. The trouble was not with the law but with the people, who were not sufficiently interested in it to enforce it.

The President asked whether spraying should be continued until the fruit is ripe.

Mr. Galloway said that as a rule the fungicides are applied when the fruit is young. He would recommend desisting when the fruit begins to ripen. At one time the grape growers upon the Hudson River were over zealous in this matter, and although the season was a dry one they sprayed their vines continuously until the fruit was ripe, and when the fruit was gathered and sent to market it was covered with Bordeaux mixture. The experience of growers varied under different circumstances, and in each case the treatment must be governed by existing conditions. In a dry season, other things being equal, two or three applications would be sufficient. In spraying for apple scab the last application should be given when the fruit is about the size of marbles.

In reply to a question upon the treatment of peach rot, Mr. Galloway said that the disease is caused by the same fungus that attacks plums, and that no remedy yet tried had been successful to any appreciable extent. The leaves of the peach are quite tender, and therefore sprays should be applied with caution.

The thanks of the Society were unanimously voted to Mr. Galloway for his interesting paper.

O. B. Hadwen announced for the next Saturday, a paper upon "Wild Flowers and Ferns," by Mrs. P. D. Richards, of West Medford.

It was also stated that for the last lecture in this course, instead of the paper on Forestry by J. B. Harrison of Franklin Falls, N. H., as announced in the programme, James Comley, of Lexington, had kindly consented to give a paper upon his recent visit to Japan.

BUSINESS MEETING.

SATURDAY, February 18, 1893.

An adjourned meeting of the Society was holden at eleven o'clock, the President, NATHANIEL T. KIDDER, in the chair.

The Secretary read a circular from Francis H. Appleton, Trustee and Secretary of the Massachusetts Society for Promoting Agriculture, announcing that James E. Owen, C. E., of the

State of New Jersey, would speak in Massachusetts at three meetings, in Beverly, in Worcester, and Boston, upon the celebrated Highways of his State, and the legislation under which they were constructed, and cordially inviting the public to attend.

Adjourned to Saturday, February 25.

MEETING FOR DISCUSSION.

Wild Flowers and Ferns.

By Mrs. P. D. Richards, West Medford.

What I shall say about wild flowers and ferns will be mostly about those I have seen growing either in their own homes or in cultivated grounds.

I have selected for description or notice, those only which seemed to me most worthy of our attention, either for beauty, rarity, or some other attractive quality, as it is impossible in the time allowed to me this morning, to even mention the names, except as a mere list, of the nearly five hundred native plants shown to the public in 1886, under the auspices of this Society.

What a fund for entertainment and education is to be found out of doors! Pleasures pure and simple for those who have eyes for seeing and minds for understanding. The early spring — after the close winter, which has kept you from the woods and fields — is getting ready for you its ever interesting and varying exhibit.

First, after the bright, fresh grass which gives token of the new life, as an object of interest, is the Hepatica or Liver-leaf (*Hepatica triloba*). This you will find on the wooded hill-sides in warm, sheltered places, as early as the first of April, if the weather has been favorable. If you have great desire to look into its bright, winsome face before that time, take up a well-budded root in the autumn, and if well cared for it will give you pleasant greeting in the first month of the new year. I experimented with a plant several years ago, that was well blossomed on the tenth of January, and continued flowering for two months, the last petals falling off on the tenth of March, just as the new leaves were appearing.

The Spring Beauty (*Claytonia Caroliniana*) is another charming flower of this season, and can be found from Maine to Minnesota,

according to the "Manual," but is not found wild in this part of our State. In fact only one natural location is given in the "Middlesex County Flora," Ashby — in the extreme western part of the county — where all sorts of entrancing things, not within our reach here, grow. Minot Pratt, of Concord, that indefatigable and enthusiastic botanist, who brought to the classical town so many treasures from the far off wild woods, beautified his own grounds with this plant, and if one could see on a sunshiny April day the mass of pretty rose-tinted, red-lined flowers just inside of the old stone wall in front of the Pratt place, there would be no question in his or her mind about the fitness of the common name, for it is indeed one of the beauties of spring.

In this vicinity, I should look for Bloodroot (*Sanguinaria Canadensis*) next. This sends up a beautiful, indented, sheath-like leaf enclosing the flower bud. The brilliant star-like flower soon opens, and well repays one for the trouble of a long walk. This plant loves moisture, and you will find its home near running brooks in the moist earth; also by rocks on the hill-side when the ground is springy. This makes an excellent garden plant. You can bring home roots with leaves and buds, which can be kept in deep saucers or platters until the flowers blossom and fall; then put the plants in the earth, and they will be almost certain to give leaf, bud, and blossom when another April sun sends its genial warmth upon the earth.

The Mayflower (*Epigœa repens*) is too well known to need any description. Although not within easy reach of our city, its popularity brings it here in great abundance. It is to be hoped that care is taken in the gathering, so that there need be no fear of its being exterminated.

The Golden Saxifrage can be found in sluggish brooks or swamps if you look carefully for it. And when you find how minute the flower is, you wonder how it can bear the burden of its long name, *Chrysosplenium Americanum*, and you resolve from that moment that nothing will tempt you to give it any other than its common name. The little, greenish-yellow flowers are, however, very interesting when seen through a powerful glass, and, as it is still early spring, every flower counts.

The Early Crowfoot (*Ranunculus fascicularis*) dots the southern hill-sides with its bright yellow flowers, and *Cassandra calyculata*, with its racemes of white heath-like bells and leathery

looking leaves, adorns the upland meadows. The swamps and slugglish streams are aglow with the Marsh Marigold (*Caltha palustris*) and the "honey-yellow flowers" of the Spice-bush (*Lindera Benzoin*) greet us with their pleasant fragrance.

The beautiful Dog's-tooth Violet (*Erythronium Americanum*) — which is not a violet but a lily— often opens its flowers in the latter part of this month, and sometimes it keeps flowering for several weeks.

Those who botanize in a systematic way, know that location has much to do with the early and late blossoming of plants of the same species, and direct their steps when seeking some flower, according to the time of the month. The Dog's-tooth Violet location that I visit, is really one continuous plat of plants, by the side of the brook, branching off into the swamp and running down the hills, but I am sure to find in about the same places, the early blossoms, the middle season, and the late flowers.

If you wish this plant for the garden, always take up those that are in bud or flower — so as to be certain that the plants are mature — and if you dig deep enough and take a little earth below the bulbs, they will flourish finely in damp, cultivated ground. The foliage is so beautiful, with its pale green, mottled leaves, that a little plat of it is very attractive, even if the blossoms do fail to appear.

The Wind-flower or Anemone (*Anemone nemorosa*) is common, but varies in beauty according to location, and is, perhaps, not quite so attractive as the less common Rue-anemone (*Anemone thalictroides*) with its umbels of pure white flowers surrounded by the rue-like leaves.

Another desirable April flower for the garden is the Pasque-flower (*Anemone patens*, var. *Nuttalliana*) which grows so abundantly on the western prairies. "H. H." says in her description of the Colorado Flowers: "The first Colorado flower I saw was the great blue wind-flower, or anemone. It was brought to me one morning, late in April, when snow was lying on the ground, and our strange spring-winter seemed to be coming on fiercely. The flower was only half open, and only half way out of a gray, furry sheath some two inches long; it looked like a Maltese kitten's head, with sharp pointed blue ears,— the daintiest, most wrapped-up, little blossom. 'A crocus out in chinchilla fur!' I exclaimed. 'Not a crocus at all; an anemone,' said they who knew."

My acquaintance with these plants dates from May 3, 1888, at which time I received a box of them from Minnesota. They were entirely new to me and unknown, but they really had a familiar look, as an acquaintance had recently described to me what he supposed to be a large hepatica that he had found in the West, and my first thought was that this was that flower, and it probably was, as he had no knowledge of botany and had, from a similarity of appearance, mistaken the name. Another season I received good roots of the plant, which gave me a flower the third week in April of last year. And I am looking forward to the pleasure of seeing many more in the coming spring, for I think my plants are now well established.

The violets should, perhaps, next claim our attention. They are found sparingly in April, but are very abundant in May.

The Arrow-leaved Violet (*Viola sagittata*) loves the southerly hills and well sheltered valleys, and is the advance guard of this family. Soon will follow the Dog Violet (*Viola canina*, var. *Muhlenbergii*), which can be found in damp, shady grass, not far from the brooks, and will be readily distinguished from the other blue violets by its leafy stem and creeping branches. The common Blue Violet (*Viola palmata*, var. *cucullata*) grows abundantly by the brooks and in the meadows; and by its side or near it, the Sweet Violet (*Viola blanda*), the Lance-leaved Violet (*Viola lanceolata*), and the Primrose-leaved Violet (*Viola primulæfolia*); the last three being our white violets. The Bird-foot Violet (*Viola pedata*) loves the higher lands and can be found in fields, pastures, and woods; and, perhaps, if you look carefully and long you may be rewarded with variety *bicolor*, with its velvety upper petals looking so like a real pansy. The Yellow Violet (*Viola pubescens*) grows in the woods, and while you are looking for that, remember that the Canada Violet (*Viola Canadensis*) is also found in woody places. The least common of the violets, excepting the Canada and Yellow, is *Viola palmata*, whose leaves are usually hand-shaped, the flower large and often pale violet-blue. It is found on the slopes of thinly wooded hills, and sometimes by the roadside.

It makes a very interesting collection, if you can procure the violets all at one time, placing small bunches of each with their leaves, surrounded by moss to keep them distinct, in a deep dish or platter. Your friends will exclaim with delight, and say, as I

have heard people say with regard to similar collections, "I didn't know there were so many kinds — I thought violets were only either blue or white."

Whoever has botanized in May will remember the bright picturesqueness and extreme loveliness of the woods and hills. To me no other season has quite the charm this has. In one particularly lovely scene large, ledgy rocks jut out from the side of the hill. Rough and full of crevices is the background Nature had to work upon. A little earth thrown here and there is the beginning; then a few spores and seeds wafted by the winds and dropped by the birds. Result — wherever there is a cranny or nook, a fern or plant has established itself. Strong, bright *Aspidium marginale*, delicate *Woodsia obtusa*, the clinging *Polypodium vulgare* or Rock Fern, and almost hidden in a crevice the rare, beautiful *Asplenium Trichomanes*. The Early Saxifrage (*S. Virginiensis*) with its clusters of small, white flowers, is quite at home anywhere on the rocks where it can find foothold, and the graceful Columbine (*Aquilegia Canadensis*) with its beautiful blossoms like torches of flame, is set singly and in clusters in the clefts, where one would suppose it impossible for a plant to find nourishment. Large leaves of the Bloodroot are at the base of the rocks, and a little lower down the hill are the pretty Rue-anemone and small Solomon's Seal (*Polygonatum biflorum*). And as you ascend the hill you find the earth at the top brightened with the Early Crowfoot (*Ranunculus fascicularis*).

The treasures of this and the summer months are so great and varied that it is extremely difficult to know which to select for notice, although there are certain flowers that one must never ignore, as who would ever presume to speak of the flowers of May and omit Rhodora (*Rhododendron Rhodora*) and Painted Cup (*Castilleia coccinea*), which last year were at their best in the second and third weeks of this month.

Corydalis glauca (the Pale Corydalis), with its rose-colored flowers tipped with yellow, is a rock flower, and seems to be content with as little nourishing soil as the brilliant columbine.

The Smilacinas, the Buttercups, — of which you will easily find four species, including *Ranunculus multifidus* (the Water Buttercup), — the Bellworts, and the Trilliums are all found at this time of the year.

Senecio aureus (Golden Ragwort), true to its name, brightens up the meadows; the *Clintonia borealis* with its greenish yellow bells

is sparingly found in damp grounds, and the Bearberry (*Arctostaphylos Uva-ursi*) now and then covers the rocks and ledgy hills with its thick evergreen leaves, being alike attractive both in flower and berry. The common western name of this plant is Kinnikinnick.

Goldthread (*Coptis trifolia*), with its glossy leaves and gold-colored roots, must not be passed by, even if its small, white flower does come and go, almost, while one is hunting for it, for it is one of the plants that can be used for winter decoration. A few plants with roots put into a glass vase, have an attractive look and can be kept all winter, and will give you flowers and new leaves before the warm days of spring.

The Mandrake (*Podophyllum peltatum*) and the Shooting-Star of the prairies (*Dodecatheon Meadia*) are both fine showy plants, well adapted to garden culture.

Ledum latifolium (Labrador Tea) grows sparingly in cold bogs, and can be found in a few locations within an hour's ride of Boston. Its beauty and rarity will repay one for a long and tiresome search for it.

Menyanthes trifoliata (Buckbean) also grows in the bogs, but if you wish to see this lovely flower at its best, you must seek it in its own home. Before I ever saw it, its rare beauty had been described to me, but I was told as I tell you, that I must see it growing. So one of my botanical friends properly introduced me to what I sometimes think is the most delicately beautiful of all the flowers of May. The upper surface of the funnel shaped corolla is white-bearded; this gives to the racemed flower its peculiar charm.

The Fringed Polygala (*Polygala paucifolia*), which is generally rose-purple, though sometimes, "rarely pure white," is thus finely described by John Burroughs: "When we came upon them beside an old wood road, it was as if a flock of small, rose-purple butterflies had alighted on the ground before us. The whole plant has a singularly fresh and tender aspect. Its foliage is of a slightly purple tinge, and of very delicate texture. Not the least interesting feature about the plant is the concealed fertile flower which it bears on a subterranean shoot, keeping, as it were, one flower for beauty and one for use."

During a botanizing trip last May, which was taken specially to have the pleasure of seeing the White Fringed Polygala in its own home, I was told by my host that there was a possibility of finding

the Painted Cup (*Castilleia coccinea*) in a meadow near by, which we would visit if the owner would give us permission to gather the precious flower. The request was made and this was the answer, sadly given: "I am so sorry, but there are no Painted Cups now, and have not been for a long time. One Sunday when I came home from church I met Mr. ——— and two friends, with their hands filled with big bunches of the pretty flower, and since that day I have never found a single plant in the meadow. I am so sorry, for I did so love to have them to take to church on Children's Sunday. But," she said, brightening up a little, "the Rhodora grows back of the barn, and the Blue Fringed Gentian (*Gentiana crinita*) by the brook here," pointing to some low land through which a small stream made its way.

What treasures on one small farm! Rhodora, Painted Cup, and Fringed Gentian — three of our most charming flowers, which had been immortalized in verse, close neighbors to each other! And how sad the thought that some one who ought to have known better had exterminated one of them.

If you really love the growing life about you, do not carelessly and recklessly destroy it. Take with care what you need and can use, but be sure that you do not eradicate comparatively rare species. I say comparatively rare, because my oldest botanical friend will seldom allow that a plant is really rare. Also, when you find fine specimens by the pathside, leave them, when you can, to gladden the eyes of other passers-by.

An excellent pteridologist wished to examine, for scientific purposes, *Woodsia obtusa*, a very pretty fern and not common in this vicinity; but the specimen most convenient for him to take, looked so lovely he could not bring his mind to the point of disturbing it, and so I presume it lives in its own home even to this day.

The last of May brings to us the first of the Orchis Family — *Orchis spectabilis* (the Showy Orchis) with its two shining leaves and its scape of whitish pink-purple flowers. This is rare in this vicinity. The first of the Lady's Slippers (*Cypripedium acaule*) can be found abundantly if you know just where to look, according to a flower report given last summer. It said "The great vase of pink lady's slippers shows that Boston children who can get into the woods may claim their orchid conservatories as well as the rich."

If you look very carefully through the bogs and low woods you may find *C. pubescens* — the Large Yellow Slipper — and if you do, you may consider it one of the red-letter days of your life; and you will be forgiven if you shout to the full extent of your voice, as an old botanical friend of mine did, when this same plant surprised him with its golden-hued slipper.

These Cypripediums make good garden plants, being very satisfactory under cultivation. A lady who has a wild garden of over one hundred plants, wrote to me last summer that she had twenty-five blossoms of the yellow slipper, having both the large and small, and both doing equally well.

When I call to mind the flowers of the first of June, I always think of the Arethusa and Pitcher Plant because I used to find them together at that time before the march of improvement took away their sustenance.

The Wild Calla, Erigerons, Cornels, and Viburnums, soon follow; and from the second to the third week we may expect to find the Wild Roses.

Have you ever noticed in your walks and drives what an important factor in nature the wild rose is? There is no plant that seems to be used so profusely and effectively by Nature for decorative purposes! By the roadside, in the thickets, along unsightly walls, the edges of swamps, and also attractive groups in the pastures — wild roses here, there, and everywhere.

> "A rose is sweet,
> No matter where it grows; and roses grow,
> Nursed by the pure heavens and the strengthening earth,
> Wherever men will let them.
> Every waste
> And solitary place is glad for them."

And then they come so early and stay so long! You ought to be able to find them from the middle of June until the first of August; and the last lingering blossom will possibly stay until past the middle of the latter month. I found, one year, a single rose — *Rosa Carolina* — on August 20. As I was entering a small swamp, its beauty beamed upon me from afar, and it was surprising to see how one small rose could brighten the scene.

If you wish to study the roses and learn their scientific names, you will have little difficulty if you give close observation. You will readily find four species and possibly five.

Thoreau says in his Journal of June 16, 1854, after describing the roses, *nitida*, *lucida*, *rubiginosa*: "I bring home the buds of the three, ready to expand, at night, and the next day they perfume my chamber. Add to these the White Lily — just begun — also the Swamp Pink and the Great Orchis and Mountain Laurel, now in prime, and perhaps we may say that the fairest flowers are now to be found, or say a few days later."

The orchids for this month are both attractive and rare, the "great orchis" (*Habenaria fimbriata*), mentioned by Thoreau, and *Cypripedium spectabile*, being the most beautiful. *Pogonia verticillata*, *Liparis Lœselii*, and *Habenaria Hookeri* are very rare in this vicinity; but *Habenaria virescens*, *Pogonia ophioglossoides*, and *Calopogon pulchellus* are not uncommon.

The Pyrolas and Chimaphilas are among the pretty June flowers, and *Linnœa borealis* (Twin-flower), beloved by the great Linnæus, begins to blossom about the middle of this month. Linnæus, during his journey through Lapland, gathered it at Lycksele on May 29, and chose it for his own special flower. Previously this pretty and singular little plant had been called *Campanula serpyllifolia* (Thyme-leaved Bell-flower) but Linnæus, prosecuting the study of plants on his new principle, soon found this to constitute a new genus. And after he became famous as a scientific botanist, he allowed his friend, Gronovius, to publish an account of it and give to the plant his name.

If you wish for special adornment for a corner of your garden, put in it that gold-colored flower, *Genista tinctoria* (Woad-Waxen), which so completely covers the hills of Salem and Lynn at this time of the year. Those same hills have been compared, when the Woad-Waxen is in its prime, to "a field of the color of gold, if it be not the 'Field of the Cloth of Gold.'" I greatly enjoy some thriving plants that I brought from Essex County a few years ago.

In the first days of July we have the interesting Milkweeds, *Asclepias purpurascens*, *A. phytolaccoides*, and *A. obtusifolia;* the brilliant lilies, *Lilium Philadelphicum* and *L. Canadense*, and the pretty little blue Day Flower (*Commelina Virginica*), which is so easily naturalized here that I want to recommend it for the wild gardens which are interesting people so much in these progressive days. This plant begins to grow wild in Southern New York and runs over the land to Florida. It is said that Linnæus named this plant for the three Commelyn brothers —

Dutch botanists — two of whom were authors, the other published nothing. The two bright blue petals represented the two brothers who did something for the world; the inconspicuous petal being for the brother who was of no use.

The Droseras, those insectivorous plants that Darwin experimented with; and the pretty Floating Heart (*Limnanthemum lacunosum*), which looks so like a small pond lily, come to us at this season. And we find — at least in one place in Massachusetts — the beautiful *Rhododendron maximum*, which grows sparingly in New England, but is very common along shaded water-courses in the mountains of Pennsylvania and southward. I saw it growing wild for the first time last year, July 16, when it was a little past its prime.

The *Cassias* — *Marilandica*, *Chamæcrista*, and *nictitans*, three interesting members of the Pulse Family, make good garden plants.

The orchids that I find in this month are *Spiranthes gracilis*, *Goodyera pubescens*, *Habenaria tridentata*, *H. lacera*, and *H. psycodes*.

The two early golden-rods, *Solidago Canadensis* and *S. juncea*, are found in the latter part of this month, as are those early Asters *A. corymbosus* and *A. macrophyllus;* and that favorite of all, the bright, cheerful looking Cardinal Flower (*Lobelia cardinalis*).

Several years ago I was told that if I should go to a town some fifty miles from Boston in the first week in August, I could find the White Fringed Orchis (*Habenaria blephariglottis*) and the Turk's-cap Lily (*Lilium superbum*), in great abundance — two flowers so beautiful that they seemed worth taking a journey of over fifty miles, to have the opportunity of gathering as many of them as I desired. So a year ago last summer I went, and had the great pleasure of seeing how and where they grew. With them were many other attractive flowers, the rarer ones being *Bartonia tenella*, *Eupatorium teucrifolium*, and *Rhexia Virginica* (Meadow Beauty).

August comes so laden with notable wild flowers that it will be hardly possible to more than mention their names. I think that the flowers of August rival those of June, mentioned by Thoreau, for I had, on August 8, 1891, the finest show of wild flowers that I have ever been able to collect at any one time. There were large bunches of the White Fringed Orchis, the

Turk's-cap Lily, Meadow Beauty, Wild Bergamot (*Monarda fistulosa*), *Cassia Marilandica*, *Coreopsis rosea*, Cardinal Flower and Golden-rod.

The Gerardias, which flower in August, are an interesting genus of plants, six of which, *G. flava*, *G. quercifolia*, *G. pedicularia*, *G. pupurea*, var. *paupercula*, *G. tenuifolia*, and *G. maritima* can be found not many miles from this city, and five Desmodiums are near neighbors to the Gerardias.

We have now the *Brasenia peltata* (Water Shield), that odd looking plant of the ponds, the submerged portions of which are covered with a mucilaginous substance transparent as glass; *Monarda fistulosa* (Wild Bergamot), *Coreopsis rosea* — which is rare north of Plymouth — four Polygalas and the beautiful *Sabbatia chloroides*, which bears transplanting, if you put it in a proper location.

Most of the Asters and Golden-rods are now in flower, for I find that on August 31, 1889, I had the blossoms of twenty-two Asters and nineteen Golden-rods. Some of them, of course, were past their prime and others just coming into flower. Many of the Asters make very satisfactory garden plants, the purple Aster, *A. Novæ Angliæ*, with its variety *roseus*, *A. spectabilis*, and *A. ericoides* being particularly good.

The Iron Weeds (*Vernonia Noveboracensis* and *V. fasciculata*), with their bright purple flowers make a fine show, and take kindly to cultivation.

The fragrant *Spiranthes cernua* is abundant in moist ground, and that odd looking orchid, Corallorhiza, which always looks to me as if it were parasitic, can be found in this month, under old pine trees.

The Closed Gentian (*Gentiana Andrewsii*) and the delicate greenish veined, white flowers of the Grass of Parnassus (*Parnassia Caroliniana*), will fittingly end this month, leaving only the Fringed Gentian (*Gentiana crinita*), Rattle-box (*Crotalaria sagittalis*), and some of the later Asters for September.

The Witch-Hazel (*Hamamelis Virginiana*) belongs to October and is the last flower of the year. Of this Thoreau says, "There is something witch-like in the appearance of the witch-hazel, which blossoms late in October and November, with its irregular angular spray, and petals like furies' hair or small ribbon streamers. Its blossoming, too, at this irregular period when other shrubs have

lost their leaves as well as blossoms, looks like witches' craft. Certainly it blooms in no garden of man's."

Wild Flowers and Ferns are so intermingled where they grow naturally, that it seems eminently proper to treat of both in the same paper.

A poet-naturalist said, "Ferns were made to show what beauty can rest in a leaf," and another charming writer of out-of-door papers said, "They are one of the triumphs of nature. Numerous in species, exquisite in form, tender in color, graceful in motion, harmless in growth, wholesome in odor, sensitive yet persistent, refined yet abundant."

You will, I think, all agree with me in saying, that this description is true to fact. What is there in nature more exquisitely beautiful and graceful than the Ferns?

The study of ferns, fascinating as it is, is often attended with many difficulties, though the helps thereto are much better than they were several years ago. I well remember the difficulties that I encountered and the long time that elapsed before I could obtain any real aid. I would take my botany and study, but the descriptive words seemed to have but little if any meaning. The plates even, as I had no named specimens to compare them with, were unsatisfactory. I finally had an opportunity to listen to a lecture by a noted Professor, and his simple, plain statements and object teaching gave me my first real knowledge of ferns. It was refreshing, after my struggle with the scientific terms, to hear him call a brake a brake, and describe the peculiar fruiting of the Pteris as a hem on the frond. These things I could understand and remember. Do not misunderstand me, and infer that I think scientific terms unnecessary, for they are all important, only it seems to me best, as I found by experience, to become familiarized with simple, general names before attempting the scientific.

Ferns, as you all know, are flowerless plants, belonging to the class called Cryptogamous. In this sub-kingdom there are several large families, among which are the mosses, horsetails, lichens, and liverworts, but the Ferns or Filices occupy the place of distinction.

Mr. George E. Davenport, one of our best authorities upon Ferns, gave you so much valuable information in his excellent paper upon the subject, read before this Society in March, 1891, that it is unnecessary for me to tell you anything about the growth

of ferns from the spores, their fruiting, and the books to be used in studying them, even if I had time, and moreover it has not been my purpose to make this paper in any way scientific, only to tell you something of some of the wild plants that have been specially interesting to me.

There are forty-two species and eight or more varieties — some of the latter being a matter of opinion among our best botanists — of ferns, that grow naturally in the state of Massachusetts. On the table at your left are herbarium specimens of these ferns which I thought some of you might like to look at.

In the forty-two species of ferns which I credit to Massachusetts I include the Grape Ferns (Botrychiums) and Adder's Tongue (Ophioglossum), which really are only Fern Allies, but are still classed with the ferns. Professor Eaton says of them, "They are not *Filices* as is now well known," but "they are closely related to them, and are certainly *Ferns* in the ordinary acceptation of the term."

In calling to mind the ferns that you have found in your walks, you will naturally first remember the spring ferns, among which are the Osmundas, or so called Flowering Ferns. These with a little study and observation are readily learned. They are among our largest northern ferns. I have found fronds of the Royal Fern (*Osmunda regalis*) and the Interrupted Fern (*O. Claytoniana*) nearly five feet in height. The Royal Fern is the only Osmunda growing in Great Britain, and is much valued in that country, where it has been known to attain the height of twelve feet, though its general growth is from six to nine feet.

It is related that one of the boatmen employed by Sir Walter Scott on his visit to Killarney, said that Sir Walter scarcely uttered a syllable in praise of the scenery, but when he came to a spot where the Royal Fern grew in abundance, he stopped the rowers and exclaimed, "This is worth coming to see!"

You will, I am sure, also be attracted by the almost feathery fronds of the Lady Fern (*Asplenium Filix-fœmina*), which you will often find by stone walls and near the edges of the swamps. This is the favorite fern of the poets. Scott thus alludes to it:

> "Where the copse is the greenest,
> Where the fountain glistens sheenest,
> Where the morning dew lies longest,
> There the Lady Fern grows strongest."

Shirley Hibberd compares it "to a plume of ostrich feathers of the most intense and delicate tint of yellowish green." The shade of green however varies much with situation and age.

Aspidium spinulosum, one of the Shield Ferns — partially evergreen — is to me one of our most beautiful ferns. It may be that the real use I can make of its beauty has much to do with its being such a favorite. If you take up a root in August or the first of September, before the autumn winds and rains have broken the stipes, you will have a fern for your parlor that will give delight to yourself and your friends for months. And when the fronds get broken, as they probably will in time, cut them off, put the fern where it will have a gentle freeze, and let it rest awhile. In the latter part of March give water, heat, and light, but not much sunshine. If the proper conditions have been observed you will have in about two weeks a fern whose delicate beauty will charm every beholder, and it will be particularly interesting to yourself, for you have watched day by day its almost magical growth.

The Ostrich Fern (*Onoclea Struthiopteris*) is, as Mr. Davenport told you, an excellent garden fern. It is also very satisfactory for house growth and experimental purposes. This fern is rare in this vicinity. I know of but three locations in Middlesex County, and only three are mentioned in the Essex County Flora.

Late one autumn an Ostrich Fern plant was sent to me by mail from Lincoln, Massachusetts. It spent the winter in a cold room, put loosely into the earth, and a little water was given at long intervals to prevent it from becoming absolutely dry. It was properly potted and brought into a warm room a little after the middle of April. On April 24, I felt certain that one of the crosiers had moved upward a little and that there was no doubt now about the life of the plant.

On May 1, the frond was twenty-one inches long, showing that it had grown nearly three inches each day. After the first week the growth was not so rapid, but there were in due time six beautiful, well developed fronds, forming a perfect vase shape. The slender stem was well defined, then a gradual curve outward of rare symmetry, until the broadened fronds bent over their tips for the rounded edge. Later, one fertile frond was developed in the centre, but if the plant had remained in its own home there probably would have been more.

In writing to a botanical friend about it, I said, "I am curious to learn how long I can keep the fronds bright and green. Will they know when the time for the sere and yellow leaf comes, and droop and decay just the same as when out of doors? Time, I suppose, will answer me if I patiently wait."

And this I wrote as the result:

"Perhaps you may remember that I was experimenting with an Ostrich Fern last year, hoping to induce it to retain its dress of green until the end of the autumn months at least. But when Miss Ostrich found that her sisters, aunts, and cousins were donning suits of russet brown, she was very desirous of following the fashion. And when I remonstrated and told her that although the brown was a handsome color, it was not durable — that the dress would soon be ragged, torn and faded, she would sigh and put on such an unhappy look I knew that she would take advantage of the first opportunity to dress like the rest of the world, and she did. She held up her head two or three weeks longer than her out-of-door relatives, but the fatal dress brought her to grief about the middle of October, when she went to join the great majority."

I have here a dried frond of what Professor D. C. Eaton says is "the largest of all the ferns of the United States," *Acrostichum aureum*. It is often from eight to eleven feet high, and its United States habitat is Florida. It is perhaps the only known fern which grows only within the influence of salt water. It is found as far as the water is brackish and ceases as soon as the water becomes entirely free from salt. I have sent four times to Florida for a living plant; three attempts have failed but I expect another plant soon which I hope will grow. This specimen was brought to me from the Island of Jamaica. You will find an herbarium specimen on the table which was gathered in or near Rio Janeiro.

This growing fern, *Scolopendrium vulgare* (Hart's Tongue), is among the rarest of the American ferns, but is a common plant in Europe.

I specially recommend our native ferns for garden culture, for I have many times seen them most successfully grown.

This I quote from a letter giving some description of a wild garden: "I wish you could see two most luxuriant and graceful clumps of maiden-hair fern — one growing against the front wall of this old brick house, with fronds all leaning outward, and a

very thick patch in the open garden, fronds growing all round. Every one recognizes their marvellous beauty."

It has been most truly said by a writer about plants, that "Learning the name of a plant is only our introduction to it. We should never cease to study their habits, their modes of growth, and the uses of every organ in root, stem, and leaf."

"Flower in the crannied wall,
I pluck you out of the crannies,
Hold you here, root and all, in my hand,
Little flower; but if I could understand
What you are, root and all, and all in all,
I should know what God and man is."

All other books pale before the ever varying Book of Nature. There is no end to the entertainment, if you look no higher than this, that is afforded without money and without price to any who have a little leisure. Without price? Perhaps not, for whatever is of real worth must be paid for in some way, and to reap a good harvest from Nature you must sow earnest seekings well mixed with enthusiasm, and then you will be repaid a hundred-fold.

Discussion.

E. H. Hitchings said:

The Committee on Discussion have asked me to say something at this time, so I will give you a few reminiscences, mainly connected with the Middlesex Fells. I have been familiar with them from childhood. Seventy-seven years ago, when I was about eight years old — as nearly as I can recollect — I picked the White Huckleberries, in Malden. About fifty years later I went to the same place and found them still growing there, and apparently on the same bushes, which looked as if they might be fifty years old or more. I picked them and had them on exhibition here in my collection of native plants. All the common flowers that grow near Boston, may be found in the Fells, and also some of the rarer ones.

But what interested me as much as anything I learned there was the fact that the wild flowers, even in this cold region, blossom every month in the year. I have spoken of this before, and you will excuse me for speaking of it again today, as I want to introduce a fact in this connection, which I think will be new

to most of you. When I spoke on this subject before I said substantially: "To those who are not accustomed to observe carefully, the vegetable world, for four months in the year, appears to be in a state of rest. But Nature knows no rest. There are no Sundays in her calendar. She works every day in winter as well as summer."

I then gave you the dates showing that flowers had been collected twenty months in succession, and also that I had found the Hepatica in flower from September to May inclusive — nine months. November 30, 1890, I found three plants in flower in Stoneham, a blue one, a dark purple one, and a large plant with white flowers and a large number of buds. December 12, two of the plants were still in flower, the purple one and the large white one. Lowell in writing of these early flowers says:

> "I, country-born an' bred, know where to find
> Some blooms thet make the season suit the mind,
> An' seem to metch the doubtin' bluebird's notes,—
> Half-vent 'rin' liverworts in furry coats,
> Bloodroots, whose rolled-up leaves ef you oncurl,
> Each on 'em 's cradle to a baby-pearl,—
> But these are jes' Spring's pickets; sure ez sin,
> The rebble frosts 'll try to drive 'em in."

But the Hepatica, or Liverwort as Lowell calls it, does not seem to mind the frost. Here they are in flower in December, with the ground frozen so hard that you could not dig up one of the plants.

I did not go into the woods again until March 10, 1891. Then the large white-flowered plant was still in blossom, the petals of the earlier flowers lying on the ground and a single bud left. George Herbert wrote, nearly three hundred years ago, "God's Mill grinds slow but sure." Here is a good illustration of it — a single plant growing and blossoming from November 30 to March 10. A plant in May usually keeps in flower about a week. But these are not the only plants that bloom in winter. The Early Buttercup, the Chickweed, the Shepherds'-purse, the Alder, and Willow and others have been found.

Let me quote you a few lines from R. W. Emerson: "If I go into the woods in winter, and am shown the thirteen or fourteen species of willow that grow in Massachusetts, I learn that they quietly expand in the warmer days, or when nobody is looking at

them, and though insignificant enough in the general barrenness of the forest, yet a great change takes place in them between fall and spring; in the first relentings of March they hasten, and long before anything else is ready, these osiers hang out their joyful flowers in contrast to all the woods. . . They bend all day to every wind; the cart-wheel in the road may crush them; every passenger may strike off a twig with his cane; every boy cuts them for a whistle; the cow, the rabbit, the insect, bite the sweet and tender bark; yet, in spite of accident and enemy, their gentle persistency lives, when the oak is shattered by the storm, and grows in the night and snow and cold. When I see in these brave plants this vigor and immortality in weakness, I find a sudden relief and pleasure in observing the mighty law of vegetation, and think it more grateful and health-giving than any news I am likely to find of man in the journals, and better than Washington politics."

Later in the season, when the Hepatica is in perfection, there is a pine grove in Stoneham where you may get them by the thousand, of nine or ten shades of blue, purple, pink, and pure white. But the dark purple ones, with their yellow anthers in contrast with the petals, are my favorites.

Still later in the season, not far from this grove, is a little brook, winding through the meadow among the alders and willows, where — about the middle of June — you may find the *Ranunculus aquatilis*, L., var. *trichophyllus*, Gray (White Buttercup), filling the brook and making it perfectly white. Further up in the Fells, is a small pond full of *Ranunculus multifidus* (Yellow Water-Crowfoot).

But the rarest of all the Buttercups found in this vicinity, is the *Ranunculus Flammula*, var. *reptans*. The nearest place for this that I know, is on the banks of a stream about twelve miles from Boston.

About a mile this side of the stream, in a beautiful white pine grove, carpeted with *Mitchella repens*, in full bloom, filling the air with fragrance, I once saw six plants of *Habenaria orbiculata*, each of them with their two large, round, shining leaves lying flat on the ground, and a scape fifteen inches high, with flowers almost as white as snow. It was a sight worth walking miles to see. I took a single plant and pressed it, and have it here now, with specimens of all the Orchids that grow in this vicinity, which I shall be glad to show you.

Not far from this grove is a bit of meadow, about half as large as this room, full of *Menyanthes trifoliata* (Buckbean), *Eriophorum alpinum* (Small Cotton Grass), and *Parnassia Caroliniana* (Grass of Parnassus).

Another place which ought not to be omitted when speaking of the Fells, is Winter Pond in Winchester. Here you may find three very rare plants, *Echinodorus parvulus*, *Scirpus supinus*, var. *Hallii*, and *Eleocharis Engelmanni*, var. *detonsa*. The *Coreopsis rosea* also grows here. In the last edition of the Manual, Professor Watson made an error in copying Dr. Gray's remarks on these plants in the "Botanical Gazette." Professor Watson says, *E. obtusa*; Dr. Gray wrote *E. Engelmanni*, Steud., var. *detonsa*, Gray. See "Botanical Gazette," October, 1878, article, "Some Western Plants."

Mrs. Richards said something about an old botanist finding the Yellow Lady's Slipper. Now I don't make any pretension to being either old or a botanist. To be a botanist requires a long life of hard study, and I have had to work for a living ever since I left school, and have had only the leisure hours, when there was no work. In regard to old age, I don't believe in Daniel Webster's theory. At a dinner of the Webster Historical Society, an anecdote was told, in which he was reported as saying to a young lady, "If you live to be fifty years old, you will find that there is nothing new to learn, nothing new to lose, nothing new to live for."

I think Longfellow took a more rational view. In a letter to a friend he writes, "To those who ask how it is that I write so many things that sound as if I were still a young boy, please say, there is a pear tree in the neighborhood or neighboring town, planted by Governor Endicott two hundred years ago; it still bears fruit not to be distinguished in flavor from that of the young tree; it makes new wood every year so that some part of it is always young. Perhaps that may be the case with some men as they grow old; I hope it is so with me."

I did find the Yellow Lady's Slipper. I had been looking for it nine or ten years. I knew it had been found in a large swamp about twelve miles from Boston. On the 25th of May, 1879, I invited a friend to go out with me. In the cars we met two brothers who had been looking for the flower as long as I had. Soon after we got to the swamp we found the pink azalea in

flower. Later we found the *Habenaria orbiculata* — not in blossom — and other interesting plants. About noon the older brother said, "well, C. if we expect to get home to dinner, it is about time to start; we will leave Hitchings to find the Yellow Lady's Slipper." After eating our dinner in a pleasanter place than any room I ever dined in, I said to my friend, "We have plenty of time, I will look into the swamp once more and see what I can find." In a few minutes I found thirty plants of the Yellow Lady's Slipper, all in flower, one of them with two blossoms on the stem. The next day when I came home to dinner, I found a letter from one of the brothers saying they found it a few minutes after leaving us.

We sometimes have a surprise, not so pleasant as this was. I had one last year. Three or four years ago I found the *Pentstemon pubescens* growing wild, on a rough, gravelly ridge covered with bushes, in Melrose. Two years ago I found the *Liparis Lœselii* about a stone's throw from the same place, growing in a meadow, with the Arethusa, Pogonia, Calopogon, Ophioglossum, and other interesting plants. Last year I went there, and the owner had dug away the ridge, Pentstemons, bushes, and all, and carted them into the meadow. Well, I suppose he will get a good crop of hay there sometime, but I don't think he will enjoy it half as much as I have the flowers. I have spoken about my first "find;" now a few words about my last one. July 31, 1891, I found a very rare plant in fruit. June 5, 1892, it was in flower.

Now I want to say a word or two about the names of plants. Suppose I should tell you that my rare plant was the Cancer-root (the common name), nine-tenths of this audience could probably say, "Oh, I found the Cancer-root years ago." But when I give you the botanical name *Conopholis Americana* and show you this photograph of the plant, you see at once the necessity of using the scientific name. When I saw the plant in flower, I could not help recalling Tennyson's remarkable lines, which Mrs. Richards has quoted:

> "Flower in the crannied wall,
> I pluck you out of the crannies,
> Hold you here, root and all, in my hand,
> Little flower; but if I could understand
> What you are, root and all, and all in all,
> I should know what God and man is!"

The plant is a parasite; having no root of its own, it has to borrow the root of an oak on which to grow. There is no description in the Manual, or any book that I can find of the attachment of this plant to the root of the oak, but you will see it in this photograph, and also rudiments of new plants for a year or two to come. I have a root here which shows the rudiments for five or six years.

Mr. President, there is no end to this subject, so I will close by quoting the last verse of Horace Smith's Hymn to the Flowers.

> "Were I, O God! in churchless lands remaining,
> Far from all voice of teachers or divines,
> My soul would find in flowers of thy ordaining
> Priests, sermons, shrines."

Mr. Hitchings exhibited herbarium specimens of fifty species of native orchids.

Felker L. Temple had been much interested in the essay, and wished to add a few words from his experience. About six or eight years ago he was riding upon a driveway in the wooded country near Lake Winnepesaukee, about the middle of August, when he observed a quite long branch of witch hazel in full bloom. It was so unusual a sight at that season that he stopped and examined the tree, and found that the branch had been much twisted, in fact, so much as to nearly stop the flow of sap. He was led to believe that the blooming was hastened by the exhaustion or scanty supply of sap in the branch, which would naturally be the condition at the usual time of flowering, in October or November. Several other branches, also more or less in flower, were found to be twisted in the same manner, but to different degrees.

Mr. Temple then spoke of an interesting find among the native asters. In the autumn of 1892, he and a friend found six individual plants of what seemed to be *Aster dumosus* with entirely double blossoms. These double flowers were, in one plant, about three-fourths of an inch in diameter, and in the other five from an inch and a quarter to an inch and a half in diameter.

Several other plants were also found with semi-double flowers, all of which plants have been planted out to preserve them, and it is hoped to exhibit the flowers at Horticultural Hall, in August, 1893.

Thomas Harrison spoke of the plentiful growth of Garget (*Phytolacca decandra*) in the vicinity of Stoneham and Melrose

Highlands, particularly in places where the upper surface of the soil has been removed. He admired this plant for its beautiful foliage, which he considered as striking and effective as that of either cannas or thriftily growing dahlias.

Charles W. Jenks moved a vote of thanks to Mrs. Richards for her very interesting paper, which was unanimously passed.

Thomas Harrison then moved a vote of thanks to Mr. Hitchings for the highly interesting botanical reminiscences he had given, which was also unanimously adopted.

President Kidder announced for the next Saturday, a paper upon "Carnations and Their Culture," by Richard T. Lombard, of Wayland.

BUSINESS MEETING.

SATURDAY, February 25, 1893.

An adjourned meeting of the Society was holden at eleven o'clock, the President, NATHANIEL T. KIDDER in the chair.

No business being brought before the meeting it

Adjourned to Saturday, March 4.

MEETING FOR DISCUSSION.

THE CARNATION AND ITS CULTURE.

By RICHARD T. LOMBARD, Wayland.

The Carnation, by reason of its real merit, has since 1860 rapidly forced itself into an important place in the flower trade of the northern and central parts of our country.

Nearly four thousand florists are engaged, either wholly or in part, in growing this plant for cut flowers; and it is estimated that last year fully two hundred million blooms were sold, yielding over a million of dollars to the growers.

Its variety of color, fragrance, beauty of form, and keeping quality, have made it a decided favorite, and it may justly be styled the "Flower for the multitude."

A flower of so much importance in trade, and one so generally loved, is certainly of sufficient importance for us to give it careful study.

The subject would seem to divide itself into three parts.

FIRST: — Its history.
SECOND: — Its garden culture.
THIRD: — Its cultivation under glass.

ITS HISTORY.— The wild species from which our cultivated varieties were derived is *Dianthus Caryophyllus*,— Dianthus, from *dios*, divine; *anthos*, flower; thus we have the "Divine Flower," a term generally given it and by which it is so well known. This species was called *Caryophyllus*, a designation evidently given on account of the clove fragrance of the flower. At the time of its introduction into England its prevailing color was a very light shade of pink, or more properly "flesh color," and from this fact it received its name of "Carnation." There is no doubt that under the influence of English soil, climate, and culture, its color became darker, and we find a few years later it was called "Pink."

The wild carnation was single, having but five petals, and its native habitat was extremely limited, being found only in parts of France, Italy, Austria, and in the northwest part of India; and always upon high, well drained land, where limestone was found. It has never been known to thrive in its wild state except near the habitation of man. The general construction of the plant and the character of its foliage is such that it withstands drought wonderfully, and recovers from it rapidly when water is supplied.

From one or more of the places named — but more probably from Italy — the wild variety has been naturalized in various countries, more particularly in England; but wherever naturalized as a wild plant it has only succeeded in limestone districts or near old buildings on well drained soil. As we know the plant it clearly shows the climatic influence of Southern Europe.

Its peculiarities are such that under cultivation it has taken almost any character, as to color or form of flower, which the careful cultivator has desired. It has been popular in one generation and unpopular in the next. When it was in favor the flowers were increased in size and the varieties were numbered by hundreds; and when the "carnation fever" abated, it quickly lapsed to its ordinary size and the varieties were few.

At one time the fringed petals were sought for and obtained; and at another, smooth edged or "rose leaved" petals were wanted, and this desire was gratified. The gardeners of two hundred years ago thought the flower imperfect if it did not split its calyx, and on refractory flowers the knife was used on the calyx that did not burst. But for the last hundred and fifty years great effort and care have been taken to prevent the bursting of the calyx, which to this time has not been wholly successful.

Pliny refers to the carnation as having been used in the days of Augustus Cæsar, to give a spicy flavor to wine. While greatly loved and admired by the ancients, its improvement was not undertaken to any great extent until it found a home in England.

It is not quite clear when it was introduced into England; probably as early as the year 1200.

Chaucer wrote of its cultivation in 1386, from which time it has always been considered as a florist's flower.

It was first called "Carnation" by Henry Lyte in 1578, and designated as "Pink" about the year 1600.

Edmund Spenser called it "Coronation," but this name never found common use.

Shakespeare, in "The Winter's Tale," Act IV, says, "The fairest flowers o' the season are our carnations." He also alludes to it in "Henry V."

It is well settled that as early as 1655 there were more than one hundred varieties, all of them "fair, large, and double flowers." In recent years there have been as many as one thousand varieties, each with an individual character, as color, habit, vigor, marking, whether early or late, etc.

One of the early cultivators says, "It calls forth our admiration, ministering to our delights, and gladdening the hearts of the children of men." As early as 1665 there was a large variety and as to color, we find white, various shades of pink, scarlet, crimson, and yellow for selfs; also a great number of fancy marked.

Professor L. H. Bailey, of Cornell University, has stated, "that in all probability the original color of the carnation was light, sky-blue and without fragrance." I have not found that the early writers allude to "blue" as a color of the carnation, or that any blue flowers have been known since it has been cultivated; yet the opinion of so high an authority should have great weight.

But as to fragrance, I must differ from him, for certainly the evidence is quite conclusive that, except for its fragrance, it would have remained to the end of time, the small, plain, five petalled, wild flower of its native land.

Its well known habit of "sporting" from seed has not changed for four hundred years at least, and the uncertainty of this manner of growing makes the business of raising seedlings very fascinating, as each opening bud has a charm of its own.

In 1675 John Rea, of England, had three hundred and sixty varieties, the flowers all double and measuring from two to three inches across.

The first yellow carnation was brought to England, from Poland, in 1590, and was grown extensively in the seventeenth century. It was very popular with all who grew flowers. It is evident that the cultivators of Poland, at that time, were fully as far advanced in gardening art as those of England.

This brief history would be quite incomplete, without stating that near the end of the seventeenth century, a gentleman by the name of Fairchild, living at Hoxton, England, produced a hybrid carnation between *Dianthus Caryophyllus* and *Dianthus barbatus*, and Dr. Maxwell T. Masters says, "it was not only the first hybrid carnation ever raised, but actually the first artificial hybrid *of any kind* on record."

From the earliest cultivation of the carnation to about 1810, it was entirely grown from seed or propagated by layers. At this time a new system was begun, the propagation by cuttings; the only difference in this work, between then and now, is that they obtained bottom heat by the same method we use in preparing our hot-beds, while we use steam or hot water pipes or a flue.

About 1840 the improvement of the carnation was begun in France, and actively carried on by M. Schmitt, of Lyons; and a few years later by Alphonse Alegatière, they following the same line of work so well begun by Fairchild, and with advantages to aid them of which Fairchild could not have dreamed in his time.

M. Jean Sisley made the assertion that Alegatière "created a new species." My reply to him is, that this is simply an error, for no power less than the fiat of the Deity can create a new species of any kind, for it is a well settled law that "a species may be modified by external influences, and thus give rise to races

or varieties; but it never abandons its own proper character to assume another."

The fact is that the seed of long past ages contained the latent power which, for more than six hundred years, by culture, selection, hybridization, and crossing, has marched onward and upward in development, by the well established law of evolution, until we have the perpetual varieties of today. And this development has been brought about by the careful and intelligent labor of such men as Fairchild, Hogg, and Dodwell in England; Schmitt and Alegatière, in France; and Sewall Fisher, Charles T. Starr, and others, in America,— all have contributed to the result, and the credit is not due to any one in particular, but each is entitled to a share of the honor.

The first Carnation Society was formed, and the first exhibition of the flower (as a separate exhibition) took place in England, July 25, 1850.

I have been unable to find who first grew, or at what date the first carnations were grown, in this country; they were probably grown here before the present century, for at an exhibition held by the Massachusetts Horticultural Society, August 1, 1829, a seedling carnation was shown; again on June 10, 1830, David Haggerston and the Messrs. Winship exhibited "fine carnations," and at one of the weekly exhibitions of this Society, held the same year, "one hundred different varieties of carnations were exhibited," which was a much larger number than has been shown in recent years. These were evidently the half-hardy sorts, which were wintered in cold frames. We can well imagine with what pride and satisfaction the pioneers of this grand old Society, gathered about the tables to admire the beauty and enjoy the fragrance of such a worthy display; it is quite possible that President Dearborn, Daniel Webster, Harrison Gray Otis, John Lowell, and many other notables were among those present.

In 1831 this Society offered a prize of three dollars, for the best pot of carnations.

Between 1860 and 1870 floriculture took a great start around Boston, and between these dates it is believed that importations of carnation plants were made, chiefly from France. It may have been a few years later, as I have been unable to find any data by which to fix the exact time. These importations were of the varieties called "Perpetual," and from the time of their introduc-

tion, the old half-hardy varieties seem to have almost disappeared. The first varieties to come were, La Purité and Edwardsi, and a little later President Degrauw and Crimson King; these were the foundation of those now grown.

With us, from that time, the interest in the carnation has been on the increase, and on October 15, 1891, the American Carnation Society was formed in Philadelphia.

New varieties are grown from seed, and the chances of getting one equal to or better than the parents is as one to five hundred.

I am convinced that no advance can be made without taking the best types for parents and giving them the best possible conditions. Very rarely can a good one be obtained by chance, for, as a rule, in this as in everything else, hereditary influence and environment will impress the new plant, and if you seek success these must not be disregarded.

Carnations grown under ordinary treatment, and with an unsplit calyx, have for more than four hundred years varied but little in size — from one and one-half to two and one-half inches in diameter. In England they have had flowers four inches across, but this was the flattened flower resulting from the split calyx. We have at the present time a few varieties which will, under high culture, and by disbudding and forcing, produce a few flowers from three to three and one-quarter inches in diameter.

I know of a few persons who assert, with seeming confidence, that we are to have a variety that will give us flowers not less than four inches in diameter, with stems as strong as common lead pencils, and not less than eighteen inches long, with foliage eight inches long and one-half an inch wide.

In this progressive age it will not do to say, "this cannot be done," for the seeming impossible of today is, on the morrow, not only possible but the fact. While I do not say that this point will not be attained, yet the whole history of the plant would seem to preclude a flower of such a type under any such treatment as is now given by the best growers.

My idea of a first-class flower is this, — It should be symmetrically formed; its petals fringed or serrated and of good substance; if a self, the color evenly distributed throughout its petals; its calyx non-bursting; it should be fragrant; its centre full, well raised, yet not crowded; and should measure from two to three inches across; the whole flower giving a pleasing effect to

the eye. Any flower whose petals grow well above the calyx before expanding, is not likely to burst the calyx.

The plant should be vigorous, strong, healthy, freely branching from two to three inches above the soil; foliage of a rich blue-green and not over one-fourth of an inch in width; flower stems well branched, giving a stem to each flower from eight to twelve inches long, and with sufficient strength to hold the flowers erect.

The carnation will succeed in any ordinary soil, from light sandy loam to a firm clay. It prefers a fairly rich loamy soil—well rotted turf with one-fourth its bulk of old manure, with a bushel of air-slaked lime and a bushel of hard wood ashes to every two loads of soil.

Different varieties require different soil; as a rule give the plant the same soil in which the parent plant was first grown. If a variety originated in a heavy soil and succeeded in such soil, the chances are that it found a congenial condition as to soil, and would ordinarily do best in soil of a like character; likewise, if the parent plant grew in a sandy loam and succeeded, it would be more likely to do best in such soil.

It is well settled among growers that few if any varieties do well in every place where carnations are grown; therefore, in selecting stock, take those which originated in a soil similar to that you have.

It has been said that the State of Pennsylvania has what is called a "Carnation belt," a spot of earth made expressly for this plant. I am free to admit that Pennsylvania has a great number of the special bounties of creation, for which the people of the other states are compelled to pay heavy tribute, if they desire to use them; but that it is favored with a soil or climate particularly suited for the carnation is simply a myth. To show the correctness of my position, I need only to remind you that whenever her growers have exhibited flowers in competition with those of other parts of the country, or sent plants grown within her borders to other States, the outside growers have not found anything to fear, in their competition with this, so called, favored locality, either as to flowers, plants, or new varieties.

For myself I believe in New England and her institutions. I venerate her "granite hills" and love her "rock bound coast." I honor her sons and daughters who have exhibited in this hall as fine flowers, fruits, and vegetables, produced from her rugged soil,

as can be grown north of the thirty-ninth degree of latitude, and we can all sing with Whittier:

> "But scarce would Ceylon's breath of flowers be sweet,
> Could I not feel thy soil, New England, at my feet!"

Garden Culture.— That the carnation is not more generally grown in our gardens, for summer flowering, is quite surprising, when we consider the ease with which it can be grown, and the abundance of fragrant, lasting flowers, of such varied colors. It surely ought to give more pleasure than the sub-tropical weeds which have so little to commend them; at least we should not discard the plants of our own latitude for less desirable ones from the tropics.

To have plants for summer flowering, they should be propagated in October or November, put in flats or thumb-pots, and kept in a cool house until March 1; then they should be repotted in three and one-half inch pots and have plenty of sunlight and air. Put them in cold frames about April 1, and plant in the garden from April 25 to May 10. They should be pinched back only once—about March 1.

Treated in this manner they will commence to flower in June and give a constant supply until November. In 1891 I gathered from two thousand plants an average of forty flowers per plant, and cut five hundred perfect blooms on the fifth of November. Last season was less favorable, and I did not have good flowers later than October 15.

But we want something more than this; we need the hardy and half-hardy varieties that are so plentiful in England, France, and Germany, and which were very generally grown about Boston forty years ago. They were grown both in pots and in gardens. Their cultivation is very simple; in fact the same as the Sweet Williams, if grown from seed, or they can be grown from cuttings, and protected during winter by frames. I sincerely hope they will be grown here again within a few years, at least as freely as the Sweet Williams.

Cultivation Under Glass.— Nature's method of increase is by seed, but this has proved so uncertain and slow with the carnation, that the wisdom of man has devised a way to multiply by cuttings. We can thus rapidly increase such varieties as are found best suited to our needs; by this means we retain the same

characteristics, whether they are desirable or not. But while the cutting takes a separate existence, it seems that when this method is carried on year after year the process of deterioration goes on also, until the vital force of the variety becomes so much impaired and weakened that it ceases to have sufficient strength to maintain its existence and continue profitable to the grower. Whenever man supersedes Nature's course we find more difficulties to surmount.

A cutting is a small side-shoot, which grows from a joint of the flower stem. It should be taken off when about three inches long, and the end cut smooth. The most favorable time to root them is from January 1 to March 1.

The propagating bench should be on the north side of the greenhouse, shaded from the direct rays of sunlight, and free from all draughts of air. Put in the bench clean, sweet sand three inches deep, and with a brick press the sand very firm, which will reduce it to about two inches in depth; then with a trowel cut into the sand about one inch deep. In these channels insert the cuttings, one-half inch in depth and one-half inch apart; the rows should be from one to two inches apart. Press the sand about the cuttings and water thoroughly, and afterwards water as often as may be necessary to keep the sand moist, but not soggy. In a house with an average temperature of 50° and with bottom heat from 60° to 65° the cuttings will root in about forty days, and the loss, with most varieties, should not exceed five per cent.

The cuttings, when rooted, may be potted in thumb pots, or put in "flats," and placed in a house of 55° at night, and 65° during the day, being shaded the first few days. After they have become established, put them in a much cooler house, where they may have a period of rest until put in cold frames early in April. Plant them in the field — from ten to fifteen inches apart — from April 25 to May 15. If properly hardened in cold frames they will not be injured by frost, even if the ground should freeze an inch in depth. They should be pinched back as often as required until July 1 or August 15, according to the season and the variety. Conditions having been favorable, the plants should by September 15 be large and stocky, and ready to put in the greenhouse.

The soil — compounded of materials as before named — should be prepared in the spring, and well worked over. Just before

lifting the plants, put the soil in the benches not less than five nor more than seven inches deep. If solid beds are used the soil should be six inches deep. When ready to remove the plants to the greenhouse, select a time when both plants and ground are as dry as possible.

Lifting plants should never be undertaken when the soil and plants are wet. If the plants are thirsty when taken up, they will be sure to take water as soon as water is given, after being put into the bench.

It is important to remember that no matter how fine the varieties, or how vigorous and healthy the plants, success will, in a great measure, depend on the manner of lifting and planting, and their treatment for the sixty days following their transfer to the greenhouse.

They can be lifted with either spade or fork, saving all the roots possible, and carefully removing all the soil you can without breaking the roots. I have had the best results when the ground was so dry that all the soil would fall from the roots and leave them almost as clean as the tops, but all the roots were thereby saved.

Plant them in the bench from six to twelve inches apart according to variety; they must not be planted any deeper than they were in the field; if they are they will surely rot off just at the surface of the ground. Many carnations are supposed to be diseased when they rot off, when in fact the trouble is simply mismanagement and nothing more.

After the plants are set, the soil should be well wet from top to bottom, and not watered again until it shows indications of becoming dry. Syringe the plants several times a day, when the sun shines, until they are established. A slight shading of clay and water thrown on the glass may be necessary for a week or two. All doors and ventilators should be kept open constantly until compelled to close them on account of frost, and even after fires are started, the ventilators should be kept open both day and night, for a time at least. If, before fires are permanently started for the winter, a cold rain should come on, and continue for several days, do not fail to start a fire, for by doing so you will, in all probability, save your plants from the disease called "spot," as this disease is brought on by such conditions as a long cold storm and a wet soil.

The plants should never be watered unless the soil is dry, but they love and should always have a humid atmosphere, and this can be obtained by keeping the walks, and the ground under the benches, wet.

For the best results, give them a night temperature of from 50° to 55°, and from 65° to 75° during the day, with humidity from 70 to 74 per cent, and abundance of air whenever practicable.

Most varieties require to be staked and tied, or to have some other means taken to keep them up from the soil, so that air can better circulate about the base of the plants, causing them to dry off more readily after being watered.

From December 1 to March 1, avoid, so far as possible, wetting the foliage, or so late in the day that it will not dry before night. In warm weather, when ventilators and doors can remain open, to syringe at night is beneficial.

Liquid manure should be given as often as once a month after January 1, and the houses should be shaded about April 1. Under this treatment they ought to give a constant supply of flowers from October to August.

The carnation should not be overfed nor grown in a high temperature, for if this is done its constitution becomes impaired and disease quickly makes its appearance.

The insect enemies of the carnation are few; a weekly fumigation with tobacco, and humidity at 74 per cent, will prevent their appearance; where red spider can live, the carnation has not a congenial home.

As to its diseases I can only say the "Spot," if it appears, will depart when the conditions on which it lives are removed.

The disease called "Rust," while new with us, is quite generally found at present. As yet we know but little of it; my observation is that, while it is troublesome and annoying, it can readily be kept under control.

Other than these, there is no disease which has come under my notice, except the general loss of vitality in certain old varieties, due to conditions which I have previously stated, and which might properly be called "old age."

I have thus given you the history of the carnation from the earliest known record to the present time, and the manner of its culture derived from the combined experience of the best growers. I am well aware I have left unsaid much that is important, yet it would

be quite impossible to go further into detail in the time at my disposal, and in closing I cannot say anything better for the carnation than did Thomas Hogg, as follows: — "Of all the flowers that adorn the garden, whether they charm the eye by their beauty, or regale the sense of smell by their fragrance, the carnation may be justly said to hold the first rank."

Discussion.

William H. Spooner requested Mr. Lombard to name his choice of the best six varieties of carnations at this time.

Mr. Lombard, after referring to the great variety of opinion that exists upon that point, named Silver Spray, white; Buttercup, yellow; Grace Wilder, pink; Hector, scarlet; Ferdinand Mangold, crimson, and J. J. Harrison, variegated. More growers succeed with these varieties than with any others, while many growers would not consider some of them first-class.

A lady inquired as to the value of ashes in soil for carnations.

Mr. Lombard replied that he had found the following formula best adapted to growing these plants: He cut, and placed on the ground, a layer of good sod or turf, face down; upon that a layer of hard wood ashes; over that course he put a layer of well-rotted horse manure, and lastly a layer of air-slaked lime. The proportions of the materials are three parts sods, one part of manure, and one-fiftieth part of ashes and lime, one-half each. If the turf is from a clayey soil, use horse manure; if from a light sandy soil, use cow manure. The whole history of the carnation shows that it is fond of lime; this is a very important point. Wood ashes are good for everything in vegetation. With the exception of Buttercup and Fred Creighton, which succeed in heavy soils, all varieties of carnations now grown prefer a rather light, but rich soil.

Lucius H. Foster inquired whether the essayist anticipated an advance in the price of carnation flowers, with the possible increase in size and quality. They have been selling at one dollar per hundred; will they not bring from eight dollars to fifteen dollars per hundred in coming time, as has been the case in regard to the chrysanthemum?

Mr. Lombard believed there would always be a limited demand for the largest flowers produced, and that the price for them might

range from ten to fifteen dollars per hundred; but the greater demand would be for flowers of three inches and less diameter. Perhaps one-fourth of the crop might be from three and one-fourth, to four inches across.

Mr. Foster asked whether it is probable that the greatly enlarged flowers will be of as good quality in other respects as are the best flowers of today?

Mr. Lombard said he thought the tendency was to produce large flowers with long stems, but that to gain those points, other qualities, such as number of flowers, fragrance, delicacy of color, etc., must be sacrificed to size, just as in the chrysanthemum. Still he believed improvement would go on, and that in time we may have large flowers that are perfect otherwise, but it will take a long time.

Mrs. E. M. Gill asked whether the lecturer ever used soot or salt in his carnation soil.

Mr. Lombard replied that he had not used soot, but had used about two quarts of salt in a load of loam, or mixed soil, with good effect.

Mr. Foster asked whether lime was used as a fertilizer, or only to make the soil sweet.

Mr. Lombard had used air-slaked lime to keep soil sweet, but lime is an important ingredient in soil for carnations, not only as plant food, but in its effect on other elements in the soil.

A gardener asked for information about sea sand for the cutting bench.

Mr. Lombard did not consider that any one kind of sand afforded special advantages. It should be sweet — that is the important point; he had tried many kinds of sand, from different localities. Beach sand should be thoroughly washed; so with most other kinds. He preferred sand from a place which was exposed to the sunshine. For the cutting bench, Thomas Hogg used sand and loam, half and half, successfully. The speaker has a young man who secured eighty per cent of cuttings from using all loam. He regarded both salt and lime as beneficial to carnation plants.

Joseph H. Woodford suggested in preparing cuttings for the bench, after cutting square across just below a joint, cutting a slit upwards, about half-way or more through the joint. In his experience he had found the loss was less than one per cent; an important consideration when handling choice varieties. Mr.

Woodford added that the carnation is an excellent plant for an outside window garden. When in Northern Italy, he noticed they were used in that way very freely and with beautiful effect.

Mr. Lombard agreed with Mr. Woodford's views, and proposed that this Society offer liberal premiums for half hardy varieties for the purpose last mentioned.

Mr. Foster wished to learn whether the essayist's opinion had changed in regard to lifting carnation plants dry.

Mr. Lombard stated that long ago he thought it necessary to keep a ball of earth on each plant. But three years ago he received a lot of three hundred plants, which were sent without earth. On opening them they began to wilt, and he feared that he should lose all of them. He threw some soil over the roots, proceeded to plant them, and then watered them thoroughly. The result was he lost none. The next year he tried the dry-lifting plan on one-half of six thousand plants, with satisfactory results. Last year all of his winter flowering stock, except the Puritan variety, were thus treated; among them were twenty-eight hundred plants of Mrs. Fisher, of which up to the present time he had lost only three plants. With proper care in handling the plants during the transfer from the ground to the winter benches or borders, there is no good reason why every plant should not live. If the roots are saved in lifting there is no risk.

Mr. Foster asked whether the plants are staked and tied up before they are brought into the house, and before they are watered.

Mr. Lombard replied that the plants are tied up as soon as set, except a few varieties, like Tidal Wave; and as soon as a space of about four by six feet is filled, it is thoroughly wet down. The plants being taken up dry and set at once, are thirsty, and take up water readily; they start to grow immediately and are soon in flower.

Hon. John D. Lyman, of Exeter, N. H., mentioned tree-mould and soot, and asked if they were valuable as fertilizers.

Mr. Lombard said that if vegetable matter rotted or was burned the process was very similar, but rotted wood has not the quality of ashes, although it has a value, because all decayed vegetable matter is a fertilizer, but rotted wood is very poor compared with decomposed leaves. He had never used soot as a fertilizer, as he could not get it in sufficient quantity to test it.

Mr. Woodford asked about overhead watering for carnations growing in the greenhouse.

Mr. Lombard replied that from the first of December to the first of March, no water should be applied to the foliage; but at all other seasons, when the ventilators can be left open, and especially in warm weather, carnations enjoy overhead watering.

On motion of O. B. Hadwen, seconded by Leverett M. Chase, a vote of thanks to Mr. Lombard, for his interesting and instructive lecture, was unanimously carried.

Mr. Hadwen, as Chairman of the Committee on Discussion, announced for the next Saturday, a paper upon "Poisonous Plants," by Professor William P. Brooks, of the Massachusetts Agricultural College, Amherst.

BUSINESS MEETING.

SATURDAY, March 4, 1893.

An adjourned meeting of the Society was holden at eleven o'clock, the President, NATHANIEL T. KIDDER, in the chair.

No business being brought before the meeting it

Adjourned to Saturday, March 11.

MEETING FOR DISCUSSION.

POISONOUS PLANTS.

By WILLIAM P. BROOKS, Professor of Agriculture, Massachusetts Agricultural College, Amherst.

The subject upon which I am to speak is one of a very comprehensive character, if treated in the broadest manner. An exhaustive monograph upon the subject, however, it is not my purpose to attempt. Such a treatment would require an amount of research and time which it has been beyond my power to devote to the work of preparing this paper. I shall therefore confine myself for the most part to a consideration of the poisonous plants of the eastern United States and of Japan, with the flora of both of which I have some degree of familiarity.

Even with this restriction my subject covers a large number of plants of various and often very valuable properties. It will possibly surprise many to learn that there are no less than thirty-nine species of poisonous plants in the United States, either indigenous or naturalized, which are mentioned in a recent work on Medicinal Plants, as either now or formerly considered valuable in the treatment of disease. Yet how common is it to see in descriptions of patent medicines the statement, that the compound "is entirely harmless, as it contains only vegetable substances." The charlatans who make up these "taking" descriptions are either wofully ignorant or count, possibly justly, upon a wonderful degree of ignorance in their—victims; shall I say? It should be more generally known that many of the most virulent of poisons are of vegetable origin. Morphine, strychnine, aconitine, and prussic acid, may be mentioned, as examples of generally known poisons which are of this character. I cannot, however, think of this faith in the beneficent nature of plants, those immediate products of the soil, and the life-giving waters, air, and sunshine, but as infinitely to the credit of human nature. Child-like man—man nearest to God—is ever trustful. It is sad to think of the many rude shocks, the result of primitive faith in the goodness of Nature, which have been necessary to teach man the qualities of the things about him. How many times, when pushed by stern necessity, he must have partaken of vegetable products with noxious qualities, only to repent when too late; perchance escaping himself, to continue a life held worse than death, bereft of those he held dearer than life itself.

In taking up a subject of this character it seems desirable at the outset to form a clear conception of its exact nature and limitations. A poison, in the ordinary understanding of the term, signifies a substance capable of destroying life when taken in small quantities. More generally a poison may be defined to be a substance having an inherent deleterious property, rendering it capable of destroying life by whatever avenue it is taken into the system; or it is a substance which when introduced into the system, or applied externally, injures health or destroys life, irrespective of mechanical means or direct thermal changes. Only when taken in the sense implied in the last of these phrases does the term become comprehensive enough to include all the plants of which I shall speak.

I find, however, the decision of the question, what plants to take up, somewhat difficult, since my subject is poisonous plants and not vegetable poisons. Under the latter caption the limitations of the subject would be perfectly evident; but, while I find no difficulty in defining a poison, and while it is usually possible to ascertain from published works whether any given plant contains a poison, I do in some cases find myself in doubt as to whether a given plant should be regarded as poisonous. Just what should be comprehended under the term poisonous plants, I find it troublesome to decide. Should I, on the one hand, consider all plants poisonous which contain a compound capable of acting as a poison; or, on the other hand, should I include under the term only such plants as are likely to cause disease or death when some natural part or product of the plant is in question. In other words are we to rank as poisonous all plants from any part of which a poisonous principle can be extracted in quantity howsoever small; or should we restrict the term to such as contain the poisonous principles in such quantities as to render the use of some part or parts in natural form dangerous to health or life? Should the subject be considered in the former sense, even with the geographical restrictions which I have assigned myself, it would comprehend such a number of species as to render its appropriate consideration upon this occasion an impossibility. My intention, therefore, is, to include only such species as may be dangerous to either man or beast in such forms as they are likely to be met with or prepared without resort to the refinements of chemical extractive processes.

The poisonous principles found in plants are of several distinct classes. By far the greater number of vegetable poisons, however, are alkaloids; but besides compounds coming under this class, there are a few poisonous acids and glucosides. In a number of instances the poisonous principle resides in an essential oil, while in a rather surprising number it has not yet been determined. The natural alkaloids are complex and quite variable compounds somewhat resembling ammonia. They contain carbon, hydrogen, and nitrogen, and some of them also contain oxygen. If they do not contain oxygen they are usually volatile. One of the best known of the non-volatile alkaloids is morphine, the most active principle in opium, which, as is generally known, is derived from the poppy. Nicotine, the well known poisonous alkaloid of tobacco, is an

example of the volatile class. The vegetable acids are also of very variable composition. They contain carbon, hydrogen, and oxygen. One of the most poisonous is the oxalic acid, found in sorrel and many other plants; fortunately it is usually in proportion so small that the plant is harmless.

The glucosides are compounds, usually containing only carbon, hydrogen, and oxygen, but in a few instances nitrogen also, which, combining with water, have the property of forming that sugar which is known to chemists as glucose (grape sugar), or some other saccharine matter. The poisonous principle in the buttercups and euphorbias appears to be of this class.

The essential oils, all containing carbon and hydrogen, and some in addition nitrogen and oxygen, are yet more variable in their composition. Such oils are in some cases volatile; in others they are non-volatile. Oil of hemlock, oil of tansy, and oil of juniper, are well known examples.

Concerning the general nature of the poisonous principles found in plants, I have only to add that in numerous instances compounds of more than one of these classes co-exist in the same plant. Thus, for example, in the poison hemlock we have an alkaloid, an acid, and an essential oil, while in the buttercups we have a glucoside, an acid, and an essential oil.

Poisons have been included under four classes, known as corrosives, irritants, neurotics, and gaseous. The first three of these classes are abundantly represented among vegetable poisons. The corrosives, among other general effects, eat into the delicate tissues with which they come in contact. Oxalic acid is a good example. The irritants cause violent inflammation of the parts with which they come in contact, and usually prove fatal through their action upon the alimentary canal, causing violent purging, though there are also probably always well marked nervous symptoms. The essential oils and many of the alkaloids act in this manner. The neurotics produce very marked nervous symptoms, which are the indirect cause of death. Prussic acid, morphine, strychnine, and aconitine are among the best known poisons of this class.

We do not find the gaseous poisons largely represented among natural vegetable products. These poisons sometimes act as irritants; in other cases they produce a specific effect, such as entering into combination with the red pigment of the blood,

rendering it incapable of carrying oxygen. The best — and so far as I am aware the only — example of a gaseous poison among natural vegetable products is afforded by several species of the genus Rhus, which undoubtedly sometimes poison without contact, acting as a very powerful irritant.

Concerning the Cryptogamous plants, which properly come within our field, I shall be brief. They are numerous, but in many cases neither the plant itself nor the nature of its poisonous principle is well understood.

In this connection, though possibly not in themselves directly poisonous, I must allude to the various micro-organisms which are often a cause of serious illness and even death. The development of vegetable organisms of a very low order (ferments and bacilli) upon a certain class of nitrogenous foods, such as fish and meat, sometimes results in the production within such foods of a class of compounds known as ptomaines, which are very active and virulent poisons. Here it is probably not the plant itself which is the poison, but substances which are the result of its growth. So far as the effect goes, however, it makes no difference whether it is plant or product which does the mischief, and the two have always been associated in fatal cases so far as I am aware. While I was in Japan a case, for some time very mysterious, of ptomaine poisoning was brought to the attention of the authorities. Professor H. E. Stockbridge — then of Sapporo, now President Stockbridge, of North Dakota — succeeded in tracing the mischief to the use of an article of food known to the Japanese as *sushi*. This is a mixture of rice and fish, to which a little rice wine is added, the whole being allowed to ferment until the wine is converted into vinegar. It is usually allowed to become decidedly strong before eating. The poisonous principle in this case proved to be the alkaloid known as *muscarine*, the identical compound upon the presence of which the poisonous qualities of some species of mushrooms depend. Two other ptomaines were also found in this food.

Since, under certain conditions, poisonous alkaloids may be formed under the influence of bacilli, in highly nitrogenous foods, especially meats and fish, usually perfectly wholesome, which have undergone partial putrefaction, the obvious deduction is that such articles should neither be used as food nor be given to animals.

The mushrooms perhaps more appropriately come under my subject, as many of these contain, in themselves, a virulent poison-

ous principle. This is probably in all cases dependent upon the presence of an alkaloid, of which muscarine, just now alluded to, is the best understood. This alkaloid takes its name from the species *Agaricus muscarius*, the best known and first investigated of the poisonous mushrooms. The numerous instances of serious illness, and even death, resulting from the consumption of mushrooms supposed to be edible and wholesome, should serve as a sufficient warning against experimenting with the plants of this class. No one, not perfectly familiar with all the characteristics of edible species, should venture in this field; and I shall attempt no description of the respective characteristics of the edible and poisonous mushrooms, believing that, unless made far more specific than would be either appropriate or possible on this occasion, such descriptions are more likely to prove mischievous than useful, through tempting persons, qualified neither by natural capacities nor by training to make the nice distinctions essential to safety, to select where danger lurks on every side. The only safe rule is to reject all mushrooms not positively identified by some one perfectly familiar with such matters.

Coming now to Phænogamous plants, I find a large number of species, representing many orders and genera, which are more or less poisonous. I have endeavored to exclude everything, the poisonous character of which is not well vouched for, depending, in the case of United States species, upon Millspaugh, Hooker's translation of Le Maout and Decaisne's General System of Botany, and Gray; and in the case of Japanese species, following Motoyoshi Ono's list. In some instances, the poisonous character of species in Ono's list does not seem to be confirmed by the work of occidental botanists and chemists, and I am aware that the list is incomplete. I follow it, however, in the absence of a later authority, and prefer to state the Japanese notions in regard to those species noticed, just as I find them set down.

Ono's list includes representatives of sixteen orders and twenty-seven genera, and numbers thirty-eight species. Most of the orders in this list are represented by poisonous species in the United States. The only ones not so represented are Fumariaceæ, Coriarieæ, Ilicineæ, Amaryllidaceæ, and Alismaceæ. With the exception of the second and third, these orders are represented in our flora, and possibly by species quite as poisonous as the Japanese. The poisonous nature of our species does not, however,

appear to be established. We find, also, in Japan, species set down as poisonous, belonging to Phytolaccaceæ and Loganiaceæ. These orders are represented in the United States by species which contain a poisonous principle, but which do not appear to come properly under our consideration if we adhere to the rule of selection which I have adopted.

The orders represented by poisonous species in both countries are Ranunculaceæ, Papaveraceæ, Anacardiaceæ, Umbelliferæ, Ericaceæ, Solanaceæ, Thymelæaceæ, Euphorbiaceæ, and Liliaceæ. In the United States we find undoubtedly poisonous species also in Berberidaceæ, Cruciferæ, Droseraceæ, Caryophyllaceæ, Sapindaceæ, Leguminosæ, Lentibularieæ, Primulaceæ, Asclepiadaceæ, Urticaceæ, Coniferæ, Araceæ, and Gramineæ. We find, also, species which contain a poisonous principle which can be extracted by chemical processes belonging to Geraniaceæ, Compositæ, and Lobeliaceæ. This enumeration of the orders containing poisonous species, tedious in itself, has seemed necessary to show the very wide distribution throughout the vegetable kingdom, of plants which it is believed in all cases contain virulent poisons. Naturally, however, there is the widest difference in the characters and degrees of virulence of these poisons. I will now take up each of these orders and point out some of the chief peculiarities, properties, and uses of the poisonous plants in each.

RANUNCULACEÆ.—In this order all of the Buttercups are more or less poisonous. Perhaps the most active is *Ranunculus sceleratus*. Death has been known to follow from the internal use of the plant, while the yellow oil which can be extracted from all the species is a powerful poison. The active principle appears to be an acrid narcotic; but the Ranunculi contain glucosides, acids, and essential oils. The poisonous principle appears to be volatile and is generally expelled by boiling. Accordingly the buttercups are occasionally used as pot herbs and usually with safety; though illness sometimes follows. In view of the well known poisonous properties of these plants it would seem to be about time that the pleasant picture of the peaceful cow, grazing upon the yellow buttercup and making golden butter, which exists in the minds of non-agricultural writers of rural poetry and prose, were abandoned. Every farmer's boy knows that cows, as a matter of fact, never do feed on these plants.

The allusion to butter brings to mind that I have seen the statement that the juice of certain Ranunculi has been used to coagulate milk in cheese-making, in place of rennet. Such cheeses must be of the hardest white oak character, though made of the best of Jersey milk, because they could never by any possibility cure into anything other than dried curd; as it is the action of rennet during the process of curing which renders the curd in part soluble and digestible.

Besides the buttercups, we have in Ranunculaceæ one yet more powerful poisonous species, *Helleborus viridis*, in the United States. The glucosides Helleborin and Helleborein, found quite abundantly in this species, especially the former, are very powerful poisons. They appear to be most abundant in the root.

One Japanese author credits *Clematis paniculata* with poisonous properties, and says that if flower or leaf be chewed it spoils the teeth, or will cause them to drop out; and in large quantities causes vomiting, dizziness, and death. It is used as a cathartic.

Several species of Aconitum grow in Japan, and their highly poisonous character is well known. The value of aconitine in medicine as a diaphoretic is, also, too well known to need description. The use made of one or more of the Japanese species by the Ainos, the aborigines of Japan, in poisoning their arrow heads, deserves passing notice. Like most savages these people make the process of preparing their poison a secret which is known to but comparatively few even of their own numbers. As nearly as can be learned, they reduce the root to a pulp, mix it with materials of unknown character, but, in the opinion of Dr. Stuart Eldridge, who has investigated this subject,* probably inert, and then bury the mixture in the earth. When exhumed it is found to have become a stiff, dark, reddish brown paste. One side of the arrow head, which is left hollow for the purpose, is smeared with a mixture of this paste and some animal fat. About ten grains of the paste appear to be generally used. The arrow head is rather weakly lashed to the shaft, it being desired that it shall be detached and left in the wound, which, owing to the weakness of the bow used, is generally a slight one. These bows are set in the woods so as to command one of the usual run ways of the animal to be taken, and the animal himself is made to discharge

* Transactions of the Asiatic Society of Japan, Vol. IV, p. 78.

the arrow by means of a stout cord which crosses his path. The chief animals taken in this way are bears, which reach a very large size. One of the first effects of the poison appears to be paralysis; and it is asserted that the animal is almost invariably found dead, within a very short distance of the spot where wounded. The flesh of animals so killed is freely used as food; though the precaution is taken to cut out quite a large piece of flesh about the wound.

The Ainos know no antidote for this poison, saying that the only way to save life, in case of a wound inflicted accidentally or by design, is by the immediate excision of the wounded part.

BERBERIDACEÆ.—This order includes one species which Gray says is poisonous. This is *Podophyllum peltatum*, commonly known as Mandrake, the leaves and roots being drastic and poisonous. The great importance of this plant, as the source from which podophyllin, a widely used cathartic, is derived, is generally known. This plant is common and found in most collections.

PAPAVERACEÆ.—The best known, perhaps, of all the vegetable poisons, opium, which is the inspissated juice of the plant, comes from the poppy, which has escaped from cultivation in some localities, but I will not take up your time in talking of this. Besides the poppies, we have in this order, two generally known species, reputed to contain poisonous principles, viz.: *Chelidonium majus*, and *Sanguinaria Canadensis* or Bloodroot. Of the former Ono says: "It is poisonous, and cannot be eaten either boiled or raw." Millspaugh mentions no instances of poisoning of either man or beast from eating these plants; but speaks of death from overdoses of drugs extracted from them. Ono mentions, also, *Macleaya cordata*, which he says must not be eaten. He adds that if boiled with bamboo this herb has the property of making that cane soft, whence its common Japanese name.

CRUCIFERÆ—*Sinapis alba*, the White Mustard, is set down as poisonous. The essential oil extracted from the seeds is a virulent, irritant poison. Sheep and cattle, however, may be freely pastured upon the green plant with no injurious results, so that the plant, perhaps, should hardly be included in our list.

DROSERACEÆ.—The Droseras, or Sundews, contain a highly poisonous principle which has been used in medicine, and it has long been considered poisonous to sheep, according to Millspaugh.

I have never known of an instance of poisoning among sheep from eating it, however; probably because they are unlikely to eat it in sufficient quantities.

CARYOPHYLLACEÆ.—In this order we have the Corn Cockle, *Lychnis Githago*. This is a naturalized species, commonly growing in grain fields. The seed is with difficulty separated from the grain and is, consequently, sometimes ground with it; and instances of injurious consequences following the consumption of bread made from such flour have been observed. Poultry of some kinds will eat the seeds, but death follows. Some observers say that chickens will not eat it, though it is often placed before them in wheat screenings.

FUMARIACEÆ.—This order is credited by Ono with one poisonous species, *Corydalis Wilfordi*, the smell of which he says sometimes causes vomiting.

CORIARIEÆ.—This order, not represented in the United States, furnishes in Japan the very poisonous *Coriaria Japonica*. This genus, according to Hooker, contains in its leaves, and especially in its seeds, an acrid and powerful poison, and he adds that the adulteration of senna with the powdered leaves of plants of this genus sometimes makes that a fatal medicine. Ono says children in Japan often die from eating the fruit; and adds that it receives its common name from the fact that it is often used as a rat poison.

GERANIACEÆ.—Several species of oxalis and sorrel contain that very virulent poison, binoxalate of potash, commonly known as oxalic acid; but not in such quantities as to render the eating of the plants in moderation particularly injurious. There can be little doubt, however, that the practice of children's eating these leaves because of their pleasant acid taste should be discouraged. It may be remarked in passing that the tubers of some of the stemless species of oxalis are edible and wholesome.

ANACARDIACEÆ.—The numerous species of Rhus, including the Poison Ivy (*Rhus Toxicodendron*) and Poison Dogwood of this country (*R. venenata*); the Lacquer Tree (*Rhus vernicifera*), and a number of other species; including the *Rhus Toxicodendron*, or Poison Ivy, in Japan, render this an especially important order. It is the one order of poisonous plants which almost every one knows, because there are comparatively few who have not felt its effects or seen those who have experienced them. Though so

widely known and bearing such an unenviable reputation as poisonous plants, the species of this genus do not appear to be dangerous to life. The ordinary, well known effects of ivy poisoning need no description. They are caused by a volatile acid which appears to be thrown off from all parts of the plant. The ordinary symptoms, though not dangerous, should not be neglected, as under neglect permanent marks are sometimes formed. Millspaugh mentions a case where the crust formed remained chronic for thirty years.

The same authority says that a resin extracted from *Rhus venenata* is sometimes a constituent of polishes used in shoe manufacturing, and that he has met cases of poisoning among workmen whose business was the application of such dressings.

The great economic value of the *Rhus vernicifera*, which furnishes the invaluable lacquer of Japan, undoubtedly the finest of all varnishes, is generally known. This species also yields in its seeds a vegetable tallow which is collected in large quantities, extensively used for domestic purposes and largely exported. This Rhus is much cultivated for both purposes and would possibly be hardy here. I have three small trees in Amherst, which have withstood four winters and made a rapid growth.

The workmen in the lacquer industry usually suffer from Rhus poisoning at first, but soon become inured to it in so far as to suffer no active symptoms. I have often been struck with the sallow, unhealthy appearance of such workmen; but so far as I am aware this trade is not supposed to shorten life. Freshly finished lacquer ware may cause all the ordinary symptoms of Rhus poisoning; but when old there is no danger in handling it.

It appears somewhat singular, at first thought, that plants apparently so venomous are not more dangerous if taken internally. I have known a well authenticated instance of the giving by mistake (in place of a tea which, if I remember aright, it was intended should be from the elder) of a strong infusion made by steeping the stems of the poison dogwood, and it was followed by no injurious consequences. I have also seen the larvæ of a species of the gipsy moth feeding voraciously upon the leaves of *Rhus Toxicodendron*. This was in Japan where acres of forest, in which the undergrowth was a dense thicket of low growing poison ivy, were almost entirely defoliated.

The immunity of some individuals from the ordinary effects of contact with ivy and dogwood, and the extreme susceptibility

of others even to their proximity, are anomalies which it is hard to account for. There would seem to be need for furthur study concerning the nature of the poisonous principle in these plants.

SAPINDACEÆ.— This order contains one species, the Ohio Buckeye (*Æsculus glabra*), the fruit and leaves of which, Hooker says, are considered deadly poisons. I do not feel sure that the species deserves such characterization.

LEGUMINOSÆ.— *Gymnocladus Canadensis*, the Coffee Tree, furnishes some principles useful in medicine, and its seeds are said to have been used as a substitute for coffee. Insects have been observed to be attracted to trees of this species in large numbers only to meet with death as a result of feeding upon its leaves; and these leaves, sprinkled with molasses water, have been used as a fly poison with success.

UMBELLIFERÆ.— This order contains a large number of poisonous species, both in the United States and Japan. Death has been known to follow eating the roots of *Pastinaca sativa*, or Wild Parsnip, and such roots seem to be especially dangerous in their second year. The roots ef *Archangelica atropurpureum* when fresh are poisonous and are said to have been used for suicidal purposes by the Canadian Indians. In regard to *Æthusa cynapium*, or Fool's Parsley, there appears to be some difference of opinion, some asserting that it may be freely eaten; others that it is highly poisonous. It is possible that locality sometimes affects its character so far as to make it at times harmless; but it appears impossible to doubt that serious illness and even death sometimes result from eating it. Millspaugh quotes from a German medical journal, an account of the fatal poisoning of two children through partaking of soup in which this plant was boiled. *Thaspium aureum*, or Meadow Parsnip, appears to have a highly poisonous root. The fatally poisonous qualities of *Cicuta maculata* (Water Hemlock) and *Conium maculatum* (Poison Hemlock), are too generally known to need especial mention. I do not remember to have seen any recent mention of injurious consequences to cattle resulting from eating either of these plants; but while in Japan, the Sapporo Agricultural College herd lost one fine Shorthorn cow from eating of the closely allied *Cicuta virosa*. Ono speaks of this as highly poisonous, and cautions his readers against even touching it. I doubt whether he is right here, for I have often handled it with impunity. The Water Parsnips,

belonging to the genus Sium, are poisonous according to Gray. *Conium maculatum* appears to be more poisonous to carnivora than to herbivera. Horses have been made to eat considerable quantities of the dried plant without seriously injurious consequences. Most of these plants are credited by Millspaugh (homeopathist) with yielding medicinal agents of some value. They contain both alkaloids and essential oils.

ERICACEÆ.—The laurels, azaleas, rhododendrons, and even the Indian pipe, of this order, are undoubtedly poisonous; and Ono includes Andromeda also. There can of course be little or no danger of any person's eating any part of these plants, and they are not ordinarily poisonous to the touch. There is, however, one recorded instance of such poisoning, which happened to a young lady. While she was handling the plant the stem was accidentally crushed and some of its juice spurted upon her lips. She suffered all the ordinary symptoms of Rhus poisoning. It should be added that her lips were somewhat chapped, so that more of the juice was absorbed than would ordinarily have been the case.

That sheep, especially young animals, and calves are sometimes killed by eating the leaves of both *Kalmia latifolia* and *Kalmia angustifolia* is generally known. This is most likely to occur in winter or at any time when grass is short. That some animals eat these leaves with impunity appears to be certain. Some species of deer are known to feed upon them, yet it is stated by some authorities that the use of the flesh of animals, such as the hare, and of birds, such as the pheasant and partridge, which have fed largely upon laurel or its fruit, is poisonous to man. It is asserted that the use of the milk of goats which have browsed upon poisonous herbs is sometimes attended with fatal consequences. There appears to be some doubt of the accuracy of the observations upon which these statements depend, or at least others report opposite results.

The nature of the poisonous principle in the laurels is not understood; but it is generally held that the *Kalmia angustifolia* is the most poisonous of our species. Though we cannot understand, we can the more readily believe the apparent anomalies just alluded to, in view of the undoubted fact that some of the caterpillars of the gipsy moth can freely eat leaves sprayed with Paris green and thrive thereon, while others quickly succumb to its poisonous effects.

The honey extracted from the flowers of azaleas and rhododendrons, according to Hooker, is extremely poisonous. Such honey is credited with having maddened the soldiers of Xenophon, and is supposed to have been gathered from the flowers of *Azalea Pontica*. To what extent our honey bees garner from our native and cultivated species, I am unable to state; but it would seem certain that they must do so to some extent. The uniformly wholesome character of our honey indicates that this poisonous character cannot be very pronounced.

Ono says that if cattle eat the leaves of *Andromeda Japonica* they act as if intoxicated, whence its common name, which means "to intoxicate the horse." These leaves are said to be used as an insecticide.

Our Kalmias are included among medicinal plants by Millspaugh, but they are probably of little value as such.

LENTIBULARIEÆ contains one species, *Pinguicula vulgaris*, reputed poisonous to sheep, according to Hooker.

SOLANACEÆ.— A considerable number of species in this order are undoubtedly poisonous. In the United States we have the nightshades, *Solanum Dulcamara* and *S. nigrum*, the berries of both of which appear to have been the cause of death in some instances. The fruit of the first has often been eaten without injurious consequences, but should be avoided, as there is certainly one well authenticated instance of death following its use. Numerous deaths have occurred among children as a result of eating the berries of the *Solanum nigrum* (Black Nightshade), against which they should be particularly warned. This species is found in Japan, and its fruit has the same reputation there as here, as has also that of *Solanum lyratum*. Both are reputed medicines, as are also the two United States species of which I have spoken.

Hyoscyamus niger, or Henbane, contains a highly poisonous alkaloid, Hyoscyamine; and both roots and young shoots have caused death. The seeds are more poisonous yet. The species furnishes a drug useful in some cases of delirium.

Datura Stramonium contains a highly narcotic, irritant poison. The use of its shoots as a pot herb has sometimes produced serious results. Beverly, in his history of Virginia, has the following concerning some soldiers sent to Jamestown to quell the rebellion of Bacon, who partook of these shoots: "the effect

of which was a very pleasant comedy, for they turned natural fools from it for several days. One would blow up a feather in the air; another would dart straws at it with fury; another, stark naked, was sitting up in a corner like a monkey, grinning and making maws at them; a fourth would fondly kiss and paw his companions, and smile in their faces with a countenance more antic than any in a Dutch droll. A thousand simple tricks they played, and after eleven days returned to themselves again, not remembering anything that had passed." The seeds appear, also, to be highly poisonous. The highly poisonous character of tobacco, which belongs here, is well known and will not be dwelt upon.

Our Japanese author speaks of two other Solanums, *Scupula Japonica* and *Datura alba*, as poisonous. The roots of the first, in times of famine, are gathered, he says, under the impression that they will serve as a substitute for potatoes; but they cause death. All parts of the second, he says, are poisonous. The seeds cause insanity, and its common name signifies "mad egg plant."

PHYTOLACCACEÆ.— Ono says the root of *Phytolacca Kœmpferi* produces craziness and even death; but that it will cure chronic rheumatism.

ASCLEPIADACEÆ.— *Gonobolus macrophyllus*, according to Hooker, furnishes an acrid, milky juice which has been used to poison arrows; and *Periploca Græca*, according to the same authority, has been successfully used to poison wolves.

LOGANIACEÆ.— This gives us, in the United States, the so-called Pink Root (*Spigelia Marilandica*), which contains a poisonous principle but furnishes a valuable medicine; and in Japan, *Buddleia curviflora*, concerning which we find the statement that "if mixed with coal and thrown into water it causes the fish to float upon the surface as though intoxicated." It is further added that such fish are poisonous to man.

THYMELÆACEÆ. — Three Daphnes, *D. Pseudo-Mezereum*, *D. Kiusiana*, and *D. Genkwa*, are said by Ono to be poisonous, causing numbness and sometimes death. The bark of the first is sometimes used for making paper. The third, if thrown into the water, causes the fish to float upon the surface and sometimes to die. It appears doubtful whether these species deserve their reputation as poisonous, although they undoubtedly contain a

poisonous principle. *Dirca palustris*, or Leatherwood, appears to be moderately poisonous, serious results from eating its berries being recorded.

EUPHORBIACEÆ.— The Euphorbias all contain a poisonous principle. Our Japanese author includes five species in his list as poisonous, and among American species *E. hypericifolia* and *E. corollata* are alluded to by Millspaugh, as producing poisonous effects. Momentary blindness, he says, is sometimes experienced while gathering the plant. "Slabbers" in horses is supposed to be caused by these species. They are all reputed to have useful medicinal qualities. The castor bean, *Ricinus communis*, and *Elœococca cordata*, according to Ono, also contain poisonous principles. He states that death has resulted from the consumption of food fried in the oil extracted from the seeds of the latter.

URTICACEÆ.— An infusion made from *Urtica urens*, a stinging nettle, has caused intense suffering, producing frightful swellings of a most hideous appearance upon various parts of the body, but the patient ultimately recovered. The ordinary stinging sensations produced by contact with this species is too well known to need description.

CONIFERÆ.— The seeds and leaves of *Taxus baccata*, or Yew, are said to be very poisonous, but the fleshy part of its fruit is edible.

LILIACEÆ.— The False Hellebores (*Veratrum*), of which we have three species in the United States (*V. viride*, *V. Woodii*, and *V. parviflorum*), and the same number in Japan, have highly poisonous roots, useful as insecticides; the white hellebore, so useful in destroying the currant worm, coming from the root of *V. album*, which is one of the Japanese species.

GRAMINEÆ.— *Lolium temulentum*, Bearded Darnel, according to Gray, is almost the only instance of a grass with noxious qualities. Hooker says the seed is poisonous and if mixed with cereals causes "vomiting, giddiness, and intoxication."

With this hurried and imperfect sketch, I must leave this part of my subject. The limits of time which I mentally assigned myself when beginning to write have already been exceeded; but one important—and to me very interesting—side of the subject has not been touched. I allude to the reasons for the formation in plants of these poisonous principles. This subject does not appear to have been adequately studied. A somewhat careful

examination of the works on physiological botany by Sachs and Vines, and of Darwin's writings on the origin of species and cognate subjects, has disclosed little on this point. I will call attention to a few points only.

Vegetable physiologists appear generally to look upon the alkaloids as waste products, produced as a result of changes within the plant, necessary to the formation of indispensable constituents, but themselves of no further use. Organic acids and glucosides they regard as intermediate products, incidentally formed during the synthetic processes which go on in the plant. They are stepping stones, so to speak, on the road to something directly useful or essential to the plant,—the dough which later becomes the finished bread.

The acids may, in some cases, act as digestive agents, just as certain acids play an important part in the work of digestion in the animal economy.

Naturally, since there is such a wide variety among poisonous substances, the reasons for their formation must be various. My instinct is always to look for the explanation of all observed peculiarities in plants in the relations of such peculiarities to the plants themselves. Nature appears to hate useless parts or qualities in her children.

The fact that the poisonous principles in plants are often stored in parts of the plant, such as bark, leaves, or seed envelopes, which are later cast off, is regarded by Vines as evidence that they are to be looked upon as waste materials. It at once occurs to my mind, however, that it is precisely in such portions that the poison would prove useful in the particular direction in which it appears to me it must most frequently serve the species, viz.: for protection. The frequency with which we find the poison most abundant in seed and fruit suggests this purpose, for these are the parts, for the production, protection, and dissemination of which, the plant labors, so to speak, from the start. In bark and leaf, also, the poison must most efficiently serve to repel insects and animals which would consume.

In conclusion, then, I desire to express my conviction that we owe the existence of this great class of substances—for the most part so useful as medicines, though poisonous if taken in excess —to the action of that universal tendency, in obedience to which every species becomes gradually better and better fitted to survive in the unending struggle for existence.

Discussion.

Rev. Calvin Terry inquired what antidotes or remedies were recommended in cases of poisoning by the plants which had been mentioned in the lecture.

Professor Brooks replied that if the poison had been taken into the stomach, a physician should be called, but that an emetic might be given at once, and when that had taken effect, a strong cup of tea would probably prove useful, as the tannin it contained would cause the poison then remaining, if an alkaloid, to assume an insoluble form, and thus render it for the time being, harmless. Persons who enter and remain long in a poorly ventilated room, freshly varnished with lacquer, are sometimes poisoned by the gases arising from the varnish in drying. It is like Rhus poisoning, causing a distressing inflammation of the skin. A thorough bath in an alkaline water is an excellent remedy. Common bi-carbonate of soda is a good alkali for this purpose. This treatment is more efficacious if taken as a preventive. Another way to apply it is by a bandage, which should be kept constantly wet with the alkaline water.

Mrs. P. D. Richards had found a strong solution of salt and water beneficial in external poisoning, especially for botanizing students; but perhaps a wiser plan would be to wear a good pair of gloves while botanizing.

Professor Brooks remarked that most poisons from plants are acids; therefore alkaline applications, such as solutions of bi-carbonate of soda or of common salt, used either as a bath or by bandages kept saturated, are generally useful.

President Kidder said that a gentleman friend who was quite easily poisoned found that an application of soap in the form of a strong lather was a remedy. Mr. Kidder stated that he was himself very susceptible to plant poisons, and had tried the lather-bath with success, as the irruption never came out after a thorough washing of this kind.

Professor Brooks said his experience had been the same as President Kidder's, but that this treatment should be used as a preventive measure, at once upon reaching home after a ramble during which one had been exposed to such poisoning influence; otherwise it will fail.

Mr. Terry said he could hardly go within a rod of poison ivy, or other similar plants, without being poisoned. But he knew

others who were not so affected; they could even handle such plants with apparent impunity. He had been told of various remedies; one says, use peat or mud applications; another, plantain leaves; and still others recommend soap, as sure to mitigate the suffering from poisoning.

Professor Brooks referred to the Japanese as recognizing a great number of poisonous plants. They are made particularly familiar with this class of plants from their search for material for "greens;" for which purpose they make use of a great variety of wild as well as cultivated plants. He said they probably use this kind of food to a much greater extent than do any other people. Everybody rambles over fields as well as public grounds, gathering plants and young shoots for greens. In a lecture before a body of market gardeners, sometime since, a list was given of eighty-four or eighty-five species of plants collected for this purpose. Some that are poisonous when gathered are rendered harmless by cooking.

Thomas Harrison asked for a remedy for the poison of the stinging nettle.

Professor Brooks expressed doubt whether the sting of the nettle is poisonous. He spoke of a person he knew, who fed the green plant to her young turkeys regularly, and he never heard of any harm coming from such practice.

Mr. Harrison inquired whether White Sumach is poisonous. A friend of his declared it to be so.

Professor Brooks did not know that white sumach was poisonous. It appears remarkable that some persons are so highly sensitive to the poisonous effect of plants, while so many others are not at all affected by them. But while we cannot understand why it is so, we can more readily believe these apparent anomalies, in view of the fact that some caterpillars of the gipsy moth can and do eat with avidity the leaves of plants that have been carefully and thoroughly sprayed with Paris green, and apparently they thrive upon it, although most of the species die quickly after eating but little of it.

A lady knew of seven cases of poisoning; one of which was that of a little girl who simply inhaled, or tried to inhale the odor of the flowers of the Mountain Laurel— *Kalmia latifolia*.

Mr. Harrison said that if Paris green fails, as a remedy for the gipsy moth, we must find another. Stavesacre — *Delphinium staphisagria* — holds a high place among insect poisons.

Professor Brooks said that there is no doubt of the exemption of some individuals of the gipsy moth caterpillars, from the poisonous effect of Paris green. The fact has been fully established by the careful experiments instituted by Professor Fernald for the purpose of testing this question.

Mr. Terry asked why is the world filled with such dangerous productions? Why were they created? It must be another method for teaching us to discriminate between good and evil, both material and moral.

Professor Brooks believed this provision to be of practical use to the plants. It is of great advantage to them in the struggle for existence. It teaches both animals and insects to avoid them. The fact that the poison is more frequently in larger amount in the seed — the most precious product of the plant — appears to corroborate this view. This class of plants is extremely useful to us; many medicinal remedies are prepared from them, in accordance with the rules of the pharmacopœias, which are esteemed valuable. Then again, by practical experiment it is found that if some poisonous plants are cultivated, they not only lose their poisonous character, but become exceedingly valuable as food for our race; the potato is one example and celery is another. Is not the poison eliminated under culture because it is no longer necessary to preserve the species? We find that wild animals, when domesticated, lose some features or characteristics which were prominent in their primeval condition. The horns of cattle, which are very long and large in the wild state, become reduced to a small fraction thereof, after many generations of domesticated life. This rule holds good in other orders of animals.

Mrs. H. L. T. Wolcott took a practical view of the subject. She had learned that in West Roxbury the city of Boston has cut out many rods of roadside bushes, including considerable quantities of poisonous plants; and she suggested that this Society should take steps to secure the removal of such growths from roadsides in other districts, and exert its influence to have woodland freed from these dangerous plants. In this respect we have a duty to children, who should be protected from harm; especially should an effort be made to eradicate those noxious species of Rhus. She felt a deep interest in this subject as she was quite susceptible to the poison of plants, and had suffered a great deal in consequence, although she had tried every remedy suggested

by the specialists. She had also been inconvenienced by having workmen on her farm laid by several days at a time in consequence of poisoning while cutting ditches where such plants were found growing. It is better to prevent suffering, which even soap, recommended by the President, would not always relieve.

Mr. Harrison had been exempt from injury by poisonous plants nearly all his life, and thought himself poison-proof. He could formerly handle such plants freely; he would haul them up into heaps and suffer no way in consequence. But a while ago he was digging in a part of Cambridge which had been filled several feet over the marsh, and while digging at the point where marsh and filling met, he became severely poisoned. He ascribed it to the decaying vegetation, but never learned what plants ever grew there. His son had always been very susceptible to the poison of plants. Mr. Harrison believed many persons were poisoned by the poison ivy in the autumn, by gathering its brilliant colored leaves with those of other plants, they being ignorant of the character of the plants from which the leaves were taken.

Professor Brooks said that from the statements made here today showing the varying degrees of susceptibility to plant poisoning, and also the difficulty of finding men to cut down or dig up, poison ivy, it is evident that there is room for a new profession, viz.: that of "Poison Ivy Exterminators." We live in an age of specialties, and this new profession would seem to be especially suited for those fortunate individuals who are exempt from the effects of this poison. But even those not naturally exempt need not despair of entering it, for in Japan many persons who, on beginning to work in the lacquer industry, suffer more or less from Rhus poisoning, gradually acquire immunity from its effects, or at least become so far hardened that they suffer from none of the active symptoms.

Mr. Terry called attention to the fact that the leaflets of the *Ampelopsis quinquefolia* (Virginia Creeper) are in fives, while those of the *Rhus Toxicodendron* (Poison Ivy), sometimes mistaken for the former, are in threes.

John C. Hovey stated that he had never been poisoned by Rhus of any kind, but he had been poisoned by the stinging nettle,—*Urtica dioica*.

Professor Brooks, in reply to a question, said he supposed that, in cases of Rhus poisoning, the varying degrees of susceptibility

were due to the difference in the texture of the skin of the several patients; but that matter could be determined only by examination.

President Kidder spoke of a case where the plant, *Ampelopsis Veitchii*, climbing upon a stable, pushed a branch in at a window, and a horse was poisoned by eating the growing plant.

Professor Brooks stated that any green food, to which a horse is unaccustomed, may cause its death by fermenting in its stomach. Ono makes no mention of the Japanese Ampelopsis as a poisonous plant.

On motion of O. B. Hadwen, a vote of thanks to Professor Brooks for his able and instructive lecture was unanimously passed.

Mr. Hadwen, as Chairman of the Committee on Discussion, also announced that on the next Saturday, a paper upon "Aquatic Plants," by L. W. Goodell, of Dwight, would be given.

BUSINESS MEETING.

SATURDAY, March 11, 1893.

An adjourned meeting of the Society was holden at eleven o'clock, the President, NATHANIEL T. KIDDER, in the chair.

No business being brought before the meeting it

Adjourned to Saturday, March 18.

MEETING FOR DISCUSSION.

AQUATIC PLANTS AND THEIR CULTURE.

BY L. W. GOODELL, Pansy Park, Dwight.

No class of plants is attracting more attention at the present time than the aquatics. The great interest that has been awakened in them is chiefly due to the fine displays that have been made in the public parks and at the shows of our own and other Horticultural Societies, during the past few years. They are now grown in the parks of nearly all the large and many of the smaller cities of the country, and always attract the attention

of crowds of people. Boston seems to be the only large city without aquatic plants in its parks. I am informed by Superintendent Doogue, that the conditions here are unfavorable for their culture. It would be interesting to know what there is in the water or soil of Boston injurious to them.

No more attractive feature can be added to any public park, or private place, than a water garden. There are thousands of natural ponds scattered all over the country, in which the many beautiful hardy water lilies would grow to perfection, and take care of themselves if once introduced.

Nearly all kinds can be grown with success in large tubs, or cemented tanks of any size desired; and that large class of flower lovers who cannot afford a large and expensive water garden, can cultivate and enjoy them in this way with little expense. On many places there are small streams of water running through rich meadows, where an artificial pond can easily be made. The earth for the bottom of such a pond, if not already rich, must be made so, by the addition of thoroughly decayed manure. One of the most important points in the cultivation of aquatic plants, especially the tender varieties, is warm water, and in selecting a site for an artificial pond, whether it is to be large or small, it should be where it will get as much sun as possible, at least for six or eight hours during the day; and, if possible, where it will be sheltered from the cold north winds, by trees or buildings. If the water garden is to be of small size, it is best to make it in some regular form, like a circle, oval, or parallelogram; but if large, an irregular outline, like a natural pond, is more pleasing. If the water supply comes through pipes and is limited, it is necessary to cover the bottom and sides with a coating of cement. The soil should be excavated to a depth of two and one-half feet, and the bottom, after being shaped, should be pounded down as hard as possible. It should be gradually sloped to the top, from a line within four or five feet of the edge; or, it can be made of the full depth to the edge, and an eight-inch brick wall laid for the sides. This is the most common way, but it adds considerably to the expense and is not necessary, except in soils that heave badly with frost in winter. But if the edge is well protected with leaves or straw and boards — as the edge of all cemented ponds ought to be — there is not much danger of injury in any soil. A small pipe should be laid upon the bottom to some lower

part of the grounds for the purpose of drawing off the water when necessary for planting or cleaning the pond. A fountain can be added if desired, but if the tender aquatics are cultivated it should not be allowed to play except on special occasions, or when necessary to keep the pond full; otherwise the cool water would lower the temperature too much.

Aquatic plants are hearty feeders and the soil for them should be of the richest possible nature. Good turfy loam and at least one-third part of thoroughly decayed stable manure should be used, and the addition of some good, high-grade, commercial manure, at the rate of three or four pounds to each cubic yard of soil will cause a more rapid growth. The soil should be spread to the depth of a foot over the bottom and pounded down as hard as possible; then spread on two inches of sand or fine gravel to hold the soil down and prevent it from mixing with the water.

To insure success in growing the tender Nymphæas without artificial heat, shallow water is one of the most important points, as the sun heats it up much better than deep water. During the early part of the season four or five inches is enough, which may be increased to a foot as the season advances. The best season for planting all kinds of aquatics is the spring, and the first of June is early enough, in this latitude, for the tender varieties. When ready to plant, draw off nearly all the water, set stakes where the plants are to grow, and set them out just as you would set plants on dry land. The large, tender Nymphæas should be set from eight to fifteen feet apart; and the hardy varieties from four to eight feet.

In planting large artificial or natural ponds, do not, above all things, set the Nymphæas in regular rows at equal distances apart, as though it was an agricultural crop needing cultivation with a horse hoe. This I once saw done in a pretentious public park. Conceal the artificial, and imitate Nature as closely as possible. Let the planting be done in irregular groups around the margin. Give some of the plants plenty of room for full development, with here and there a scattering plant to partially connect some of the groups, but leave plenty of open water between, and in the middle of the pond.

The attractiveness of a water garden is greatly increased by harmonious surroundings, and there is no more appropriate place for the cultivation of subtropical plants, such as Cannas, Musas,

Caladiums, Castor Beans, and the like, than in a border on the north or back side.

To grow the large, tender water lilies to full size and perfection, artificial heating of the water is necessary. This is usually done by running over the bottom of the pond coils of pipes from a conveniently located greenhouse boiler. Instead of covering the entire bottom of the pond or tank with soil, it is better to put it in boxes a foot deep and three or four feet square, and a depth of at least two feet of water over the crowns of the plants is best.

In beginning a list of aquatics, the grandest of all, that truly royal plant, *Victoria regia*, should stand at the head. To grow this magnificent plant in the open air to full size, with flowers from twelve to fifteen inches across and leaves from six to eight feet, requires a tank thirty feet or more across and artificial heat, all of which involves considerable expense. But it can be grown and flowered without artificial heat with good success even in cold New England, with little expense. I have flowered it in this way for three years. The most important point to ensure success is, to get a strong growth early in the season. To accomplish this, I set out a good plant about the first of June, and then made a frame around it of planks ten or twelve feet square and wide enough to come five or six inches above the surface of the water and covered it with hot-bed sash; this gave nearly all the advantages of artificial heat; the temperature of the water and soil often rose to one hundred degrees, which caused very rapid growth, soon filling the frame with leaves. Both sash and frame were then removed to give the plant more room. My plants made leaves five feet across and were in flower for a month. The variety experimented with was the crimsoned-flowered *Victoria Randi*. This differs from the typical Victoria, in having the vertical rims of the leaves much higher, and the flowers turn to a deeper red when they fade. It also flowers earlier, and the plants do not grow so large.

Euryale ferox is an East Indian water lily resembling the *Victoria regia* in its general appearance, but its leaves are only two feet across, and they do not turn up at the edge; its flowers are small and of a deep violet color. It is much hardier and more easily grown.

The most attractive and popular of all aquatic plants are the Nymphæas, and there is nothing in the floral world more gorgeous

than some of the tropical varieties. These are divided for the sake of convenience into day-blooming and night-blooming species. The day-bloomers open their flowers early in the morning and close about the middle of the afternoon. The night-blooming varieties open after sunset and do not close until nearly noon of the next day, if the weather is cool or cloudy. Each flower opens four times. The following are day-blooming varieties:

Nymphæa Zanzibarensis is one of the most beautiful and the most easily grown of the tropical water lilies. Its flowers are of a rich, deep blue, and when well grown will measure fully ten inches in diameter.

N. Zanzibarensis azurea is like the preceding in everything except color, which is of a lighter shade.

N. Zanzibarensis rosea varies in color from a pale rose to deep rose, almost crimson in some specimens. All of the above varieties are very free blooming, beginning when the plants are quite small and continuing until frozen up in the fall. They are so hardy that they will stand a good deal of cold weather without material injury.

N. scutifolia is, also, very easily grown, and bears an abundance of flowers all summer. These are from four to six inches across and of a light blue, shading to white in the centre. It is a native of the Cape of Good Hope, and is hardy south of Washington, D. C.

N. stellata, from tropical Africa, is a free blooming and desirable species, with large, bright blue flowers.

N. gigantea is a native of Australia, and is considered by many to be the finest of all. Its flowers are of the largest size, with numerous petals of a beautiful purplish blue, shading to white at the base, and it has a mass of golden stamens. This species when well started grows freely and produces flowers in abundance, but is one of the most difficult of all to manage in the younger stages of its growth. The young plants have a disagreeable habit of losing their foliage, and the tubers then go to rest for an indefinite length of time. I have had tubers remain dormant two years, in spite of all efforts to start them into growth.

N. elegans is a pretty species from New Mexico and Texas, with small white flowers tinted with pale blue.

N. gracilis, from Mexico, has large white flowers resembling those of *N. dentata*, but the plant is of smaller growth.

N. flava, from Florida, has small, golden yellow flowers, but is of little value for northern culture in the open air, as it seldom blooms here.

N. Mexicana is a new species from Mexico, which was thought at first to be identical with *N. flava*, but it is quite distinct. The plant is of stronger growth, the foliage larger, and it also flowers quite freely in the open air here. Both of these species must be kept over winter in a greenhouse in growing condition.

The following are night-blooming varieties.

N. Devoniensis, a hybrid between *N. Lotus* and *N. rubra*, raised many years ago by the Duke of Devonshire, is one of the most gorgeous varieties in cultivation. The flowers are of a brilliant, rosy red; from ten to twelve inches across, and borne in abundance, a dozen or more often being open on a plant at one time.

N. rubra is a native of the East Indies; it resembles *N. Devoniensis*, but the flowers are more cup-shaped and of a lighter color.

N. Sturtevanti is a hybrid of American origin and a magnificent variety but a poor bloomer. It resembles *N. rubra* in color but the petals are broader and the foliage is quite distinct.

N. Lotus is a native of the tropics of the Old World. It grows in abundance in lower Egypt, and is the true Sacred Lotus of the ancient Egyptians and was sometimes engraved on their coins. The seeds and roots when dried and ground were made into bread by them. The flowers are six to eight inches across with broad, white petals.

N. dentata is the largest of all white water lilies, the flowers being from ten to fourteen inches across and of a pure, paper white. It blooms very freely through the season and is one of the easiest of the tropical Nymphæas to grow.

HARDY NYMPHÆAS.— Water lilies that will endure the winter in the Northern States are called hardy. The books tell us, and it is generally believed, that no water lily will bear actual freezing of the roots, and that they must be planted in water deep enough to be below the reach of frost. But my experience during the past winter has convinced me that this is an error, which, while easily disproved, nobody seems to have hitherto detected. One of my artificial ponds is supplied with water by a small stream which was frozen up during the severe weather of January, and the pond dried up, freezing to the bottom. This pond contained my stock of *Nymphæa odorata rosea*, *N. alba candidissima*, and

N. Marliacea chromatella. Being very anxious as to their condition I had large blocks of ice cut out. The roots were frozen solid in the soil to a depth of six inches and had to be cut out with an axe. Several of each variety were thrown under a greenhouse bench to thaw out, when it was found that not a single bud on them was injured in the least, and they are now making good growth in a tank of water. It is very likely that other varieties will also stand freezing of the roots, but this can only be determined by actual tests, as some varieties may be more susceptible than others.

Nymphœa odorata is our own well known, fragrant water lily, and is considered by many the most beautiful of hardy varieties.

N. odorata rosea has beautiful rose-colored flowers, and is known as the Cape Cod Pink Water Lily, because it was first discovered there many years ago. It is now extensively cultivated and is generally considered the most lovely of hardy varieties.

N. odorata superba is a fine variety with larger flowers than the type.

N. odorata minor is a variety having flowers only about one-half the size of the common, and is very pretty. It grows in abundance in the ponds of New Jersey.

N. odorata sulphurea is a new variety with yellow flowers and will no doubt become a great favorite. Its foliage is mottled with reddish purple and brown spots.

N. odorata exquisita is a new variety with rosy carmine flowers, of a deeper shade than those of *N. odorata rosea.*

N. odorata gigantea is a native of Florida, where it was discovered two or three years ago. Both flowers and foliage are larger than the type. The flowers are more cup-shaped and are produced later in the season and it is a freer bloomer. The leaves are very large and thick, often measuring over a foot in diameter, and sometimes nearly two feet; their edges are ruffled and sometimes turned up, forming a slight rim after the manner of the *Victoria regia.*

N. odorata Caroliniana is the largest and finest of all the *odorata* varieties. It is supposed to be a cross between *N. odorata rosea* and *N. alba candidissima*, and was raised by Dr. H. T. Bahnson of North Carolina. It has the vigorous habit and free-flowering qualities of the latter variety. The flowers are quite fragrant, from four to six inches across, and of a delicate salmon-rose color, deeper in some specimens than in others.

N. alba is the common White Water Lily of Europe, with flowers larger and more freely produced than those of our common variety, but without fragrance.

N. alba rosea is a pretty, pink variety of the preceding, but not so deep in color as our Cape Cod pink variety nor as desirable, as it is a poor bloomer.

N. alba candidissima is the largest and best of all hardy, white water lilies. The flowers are pure white, the petals very broad, and much more waxy than those of *N. odorata*. It begins to bloom in May, and continues to bear its superb flowers in abundance until frozen up in the fall. With good treatment the flowers measure from five to seven inches across, and I have counted as many as twenty-two open at one time on a strong plant.

N. tuberosa is the common, native species of the Western States. It has large white flowers, but does not bloom well in cultivation.

N. pygmœa is the smallest water lily known and is a little gem. It is a native of China and Siberia. Its flowers are white and about the size of a silver half-dollar, opening at noon and closing at night. It is a free bloomer, being the first to flower in the spring and the last in fall.

N. pygmœa helveola is a good variety with light yellow flowers about two inches in diameter.

N. Marliacea chromatella is one of the very choicest and best of the hardy varieties. The plant has the vigorous habit of *N. alba candidissima* and it flowers freely from May to October. The flowers are from four to six inches across, with broad petals of a beautiful light yellow, and bright orange stamens. This variety should be grown in water two feet or more deep. If grown in shallow water its abundant foliage grows in a bunch so thickly as to hide the flowers, while in deep water its leaves spread out and float on the surface.

N. Marliacea albida has medium sized flowers of a pure paper white, resembling those of *N. alba*.

N. Marliacea carnea is of a delicate blush or flesh color, and a charming variety that will become popular.

N. Marliacea rosea is of a delicate rose color, deeper than the preceding, and a great acquisition.

N. Laydekeri rosea is the newest and one of the finest of the small varieties. Its flowers, which are freely produced and are

about two inches across, are of a peculiar rosy-purple color in the centre, shading to white at the tips of the petals.

Nymphæas cross with each other very readily, but the raising of new varieties in this way is yet in its infancy, and the possibilities in this direction have only just begun to be realized. The time is not far distant when varieties will be much more numerous than now. M. Marliac, the French grower to whom we are already indebted for some of the choicest varieties, has two superb novelties which will be flowered for the first time in this country at the Chicago Columbian Exposition. One of these has been named *N. Laydekeri rubra punctata*, and has large flowers variegated with brilliant red. The other, named *N. Marliacea flammea*, has flowers of an amaranth red with orange red stamens. Several American growers are also doing good work in this line. Benjamin Grey has a beautiful new variety which has been named *N. Greyæ*; it is a cross between *N. gracilis* and *N. scutifolia*. In habit it resembles the latter, but the flowers are of a bright rose pink, are larger than those of *N. Zanzibarensis*, and borne on stout stems from fifteen to eighteen inches above the water. It is a great acquisition.

William Tricker, of Staten Island, has a new variety, not yet named. It is a seedling of *N. dentata*, supposed to be crossed with *N. Zanzibarensis rosea*. The petals are wider than those of *N. rubra*, and more like those of *N. Sturtevanti*. They are white at the base, shaded to rosy carmine at the tips.

Some varieties of water lilies are easily grown from seeds, and it is exceedingly interesting to watch their development from the seeds to flowering plants. The easiest to raise from seeds are the *Nymphæa Zanzibarensis* varieties, *N. scutifolia*, *N. cærulea*, and *N. dentata*. The seeds should be sown in February or March, in small pots of good soil well firmed down. Scatter the seeds on the surface and cover with an eighth of an inch of fine sand. Then they should be immersed in a pan of water deep enough to cover the tops an inch or two. The water should be kept at a temperature of from 75° to 80° until they germinate, which will be in from six to ten days. If the temperature is much less than that named they will not germinate at all, or only after a long time. The seeds of *N. dentata* require about three weeks. Before the plants get crowded they should be transplanted to three-inch pots, and be shifted to four inch, if necessary, before the time to plant them out

in June. Those who have no greenhouse can start the seeds near a stove in the dwelling-house where the water will keep at the right temperature, moving them to a hot-bed, cold-frame, or a warm, sunny window, when up. The little plants grow with astonishing rapidity under proper conditions, and begin to bloom in about one hundred days. I have had the Zanzibar varieties begin to flower in sixty-five days, from seeds started in June. These varieties are particularly well adapted to tub culture.

The *Victoria regia* is always propagated from seeds, which should have the little caps or shells that cover the germs, carefully removed before sowing. Plant in five inch pots in February, covering them with an inch of soil. The water should be kept at a temperature of about ninety degrees. They germinate in from fifteen to twenty days, but are always more or less uncertain about coming up, even with the best of care.

The Nuphars are interesting plants, resembling the Nymphæas. They have yellow flowers borne on stems above the surface of the water. *N. advena* is our common native species. *N. pumilum* is a pretty species of smaller growth. *N. Japonicum* is a new species from Japan. *N. luteum* is a European species.

The Lotus, or Nelumbium, is one of the most magnificent of aquatic plants. Its grand circular foliage (sometimes two feet or more in diameter) and gorgeous flowers rise four or five feet above the surface of the water. Its flowers are produced freely from June to September, each flower opening four times. At first they are cup-shaped, but on the last day they expand to a diameter of from six to twelve inches. There are two species and several varieties, all of which are hardy here, having endured four or five winters where ice formed a foot or more thick over the roots. They can be grown in any warm pond with a rich, muddy bottom, in water not more than two or three feet deep. There is no reason why Lotus ponds should not become as common in this country as they are in Japan. The plants spread rapidly by means of runners beneath the surface of the mud, these runners often travelling several rods in a season. Thick tubers are formed deep in the pond, during the latter part of summer, which live over winter. The best time to move and plant them is in the spring, when they are just starting into growth, which is the latter part of May in this latitude. The tubers should be covered six inches or more with soil. The Lotus can be easily grown in large

tubs, which should be moved to a cellar in winter, or cemented basins can be made in the lawn, where it would do still better. If grown in a water garden with other aquatics the roots must be confined in compartments to prevent them from injuring other things. Make partitions of bricks, set on edge in cement, and high enough to come a little above the surface of the soil. The soil should be very rich and not less than a foot deep.

Nelumbium luteum is the American Lotus, a native of the Southern and some of the Western States. Its flowers are of a sulphur-yellow color.

N. speciosum is commonly called the Egyptian Lotus and is the "Sacred Lotus" of the Hindoos. Its flowers are creamy white shading to pink at the tips of the petals. This does best in a rich clay soil.

N. speciosum roseum has flowers of a bright pink, shading to bright rose at the tips of the petals. This variety makes a stronger growth with me than *N. speciosum*, and is in every way superior to it.

N. speciosum album grandiflorum has large, pure white flowers.

N. speciosum album striatum is white, splashed and marked with crimson on the edges of the petals, and is a superb variety.

Limnocharis Humboldti is a showy plant bearing an abundance of lemon-yellow flowers all summer. It is commonly called the Water Poppy, from the resemblance of the flowers to those of the California Poppy. It has oval, floating leaves, and multiplies by means of runners which creep about in shallow water. It succeeds best in water not more than six or eight inches deep. It is half-hardy but must be wintered in a house.

L. Plumieri is a fine, tender species, a foot or more tall, with rich, velvety, green leaves and spikes of small, lemon-yellow flowers.

Eichhornia crassipes major, which has been given the appropriate common name of Water Hyacinth, is of very easy culture and great beauty. Its glossy, dark green leaves have thick, bulb-like leaf-stalks filled with air, causing the plants to float on the water. It bears large spikes of delicately colored flowers resembling in form a spike of hyacinth blooms. Each flower is two inches in diameter and of a soft, lilac rose color with a blue blotch near the centre, enclosing a golden-yellow spot. It will grow and flower if left floating on the surface of the water, but

grows and flowers much better if set on the edge of a pond, where it can grow in the soil. Here it will soon spread and form a large mass of plants, and bloom freely for several months. It can be grown in the house in winter, in a tub, pan, or anything that will hold a little rich soil and water. It makes a very interesting window plant, and would be well worth growing even if it had no flowers.

E. azurea is a very choice and beautiful species from Brazil. Its flowers resemble those of *E. crassipes major*, but they are light blue with a deep indigo-blue centre. Its manner of growth is entirely different; it branches freely and creeps about on the surface of the water, very much like a verbena on dry land, each plant covering a space from three to five feet in diameter, and it keeps in bloom all summer.

Pontederia cordata, our native Pickerel Weed, has spikes of blue flowers and is well worth growing on the margin of an aquatic garden. There is a fine, white variety of this species which was sent me from New Hampshire last year.

Limnanthemum Indicum — the East Indian Water Snowflake — is an exceedingly pretty and interesting aquatic recently introduced. The plant throws up leaves to the surface like a Water Lily, and the flowers are borne in clusters on the petioles near the blade; roots are also emitted at the same place, forming a new plant. The flowers are pure white, an inch or more across, and thickly covered with a growth of hairs, like the Mrs. Alpheus Hardy chrysanthemum, but much more numerous. In a tub or shallow pond it will flower all summer, and all winter in a warm room or greenhouse. It will stand considerable freezing without injury, but must be wintered in a house.

L. nymphœoides is the European Floating Heart, with pretty, golden-yellow flowers. It is perfectly hardy and should be introduced with caution in an aquatic garden, as it spreads very rapidly and is liable to become a nuisance unless care is taken to keep it in check.

L. lacunosum, the native species, is pretty and interesting with its clusters of white flowers.

L. trachyspermum is a native of the Southern States, and resembles *L. Indicum*, but does not have the hairy growth.

Myriophyllum proserpinacoides is a native of Brazil, and has been given the common name of Parrot's Feather, on account of

its beautiful pinnate leaves. It grows in shallow water and is one of the prettiest plants that can be imagined for a water-tight hanging basket, vase, or tub, containing some rich soil, and kept filled with water. Several plants should be set around the edge and they will soon trail over the edge several feet in the most graceful manner, completely covering the vase or basket with the most beautiful foliage. It is not quite hardy.

Sagittaria Japonica flore pleno is a very choice, double-flowered Arrowhead, from Japan, and is perfectly hardy. The flowers are white, nearly as large and double as a balsam. It grows best in water not more than six inches deep.

S. Montevidiensis is a very large, tender species growing three or four feet high, bearing spikes of large, white flowers with a crimson spot at the base of each petal. It is easily grown from seeds and should be treated as an annual.

Ouvirandra fenestralis, the Lace-leaf Plant, is one of the curiosities of the vegetable kingdom. It is a native of Madagascar, and has long, narrow leaves which spread out horizontally beneath the surface of the water. They are of a dark green color, and are merely a network resembling a skeletonized leaf or a piece of lace. It can be grown in a warm house in pots of rich soil, immersed in a pan or tub of water kept at a temperature of about 70°.

Cyperus Papyrus is the Egyptian Paper Plant, and should be in all collections of aquatics. It has triangular stalks from five to eight feet tall, supporting at the top an umbel of long, narrow leaves. It grows best in rich soil and shallow water, and is tender.

C. alternifolius resembles the preceding, but is of smaller growth with wider leaves.

C. strictus is also a desirable species. It grows six or seven feet tall.

Zizania aquatica is a highly ornamental annual grass from six to ten feet tall, which grows in abundance in the lakes and rivers of the Western States, where it is known as Indian Rice. It has been introduced, and is now naturalized in some places in the Eastern States, growing in shallow water. Care should be taken not to allow the seeds to scatter about, or it may become a nuisance in a water garden.

Azolla Caroliniana is a pretty, moss-like plant which floats on the surface of water, covering it like a carpet. When grown in

the shade it is of a beautiful green, but is tinged with red in the sun. Patches of it here and there have a very pretty effect, but it multiplies very rapidly, and soon becomes so abundant as to be unsightly, if too freely introduced.

Pistia stratiotes, or Water Lettuce, is a native of Florida. It forms a rosette of beautiful velvety, yellowish green leaves, and floats on the surface of the water, or takes root in the mud in shallow places. It needs a warm, shady place in the house.

Salvinia natans is a little floating plant with soft, green, hairy leaves.

Aponogeton distachyon from South Africa — sometimes called Cape Pond Weed — is a very fine, tuberous rooted plant, with oval, floating leaves, and forked spikes of very fragrant, white flowers. It is hardy if planted below the reach of frost, or it may be grown in a tub in a greenhouse in good, rich soil.

There are many other species and varieties of aquatics, some of them natives of this country, which are interesting and could be easily introduced in a water garden, but the above list contains the most valuable of those in cultivation at the present time.

The announcement for the next Saturday was a paper on Tuberous Rooted Begonias, by John G. Barker.

BUSINESS MEETING.

SATURDAY, March 18, 1893.

An adjourned meeting of the Society was holden at eleven o'clock, the President, NATHANIEL T. KIDDER, in the chair.

No business being brought before the meeting it

Adjourned to Saturday, March 25.

MEETING FOR DISCUSSION.

TUBEROUS ROOTED BEGONIAS.

BY JOHN G. BARKER, Superintendent of Forest Hills Cemetery, Boston.

It may be interesting to you to know who was the introducer of these deservedly popular plants; and to inform you we make an extract from the "Gardening World": "The honour belongs

to the late Richard Pearce, a native of Plymouth, England, to whose energy and daring as a traveller we are indebted for the earliest species, introduced from Bolivia and Peru. He also sent home from La Paz, *Begonia Pearcei* and *B. Veitchii*. He travelled largely and collected many good things, which were introduced by James Veitch & Sons and Benjamin S. Williams. In 1867 he went to Panama for William Bull, where, unfortunately, he contracted a fever and died a fortnight after his arrival, which added another name to the long roll of intrepid men who have lost their lives while endeavoring to enrich our gardens with the beautiful plants of foreign lands." It was said of him that "though a man of small stature he had a lion's heart, and his early death was a great loss to British horticulture."

In the "Tuberous Begonia, its History and Cultivation," by contributors to the "Gardening World," we are informed that all the varieties of the Tuberous Begonia then in existence (1888), both single and double, were derived from six species, viz.: *B. Boliviensis*, *B. Pearcei*, *B. Veitchii*, *B. rosæflora*, *B. Davisii*, and *B. Clarkei*, and of these the first named five were introduced into England by James Veitch & Sons, of Chelsea, and by them put into commerce.

We find that *B. Boliviensis* was the first of the series introduced by the Messrs. Veitch, and in 1867 it was figured and described in the Botanical Magazine, t. 5657, as "a tuberous-rooted, deciduous kind." *B. Pearcei*, the next to arrive, in 1865, also came from Bolivia. This is also figured in the Botanical Magazine, t. 5545, with description.

B. Veitchii was the next addition, made in 1867, and put into commerce in 1869. It proved quite valuable, for practically it is the progenitor of the varieties which give the round flowers so much admired. It is figured and described in the Botanical Magazine, t. 5663.

B. rosæflora was imported by the Messrs. Veitch from the Andes of Peru, and flowered first in the Chelsea Nursery in 1867. It is also figured in the Botanical Magazine, t. 5680.

B. Davisii was discovered by Veitch's collector, near Chupe, in Peru, and flowered for the first time with them in 1876, and was placed in commerce three years later. It is figured in the Botanical Magazine, t. 6252.

B. Clarkei was first flowered in 1867, and is figured in the Botanical Magazine, t. 5675.

Garden Hybrids.—The first hybrid raised in Europe, and without doubt the first one put into commerce of which any record can be obtained, was *B. Sedeni*, which was sent out by the Messrs. Veitch in 1870, having been raised by their foreman, John Seden. It was introduced to public notice in June, 1869, when it was awarded the Silver Floral Medal of the Royal Horticultural Society, as "the best new plant shown for the first time in bloom." After this introduction we find a selected list of eighteen varieties raised by James Veitch & Sons, which were sent out between the years 1870 and 1882; these were undoubtedly selected from many thousands of seedlings, which shows how very careful this firm must have been in selecting that number only in twelve years.

In our search we find that the same firm introduced a valuable white variety, which was named Queen of Whites, and was sent out in 1878, at half a guinea each. About 1871, the interest in the tuberous begonia was developing very rapidly, and we find that James O'Brien (then with Messrs. E. G. Henderson & Son), Mr. Bull, Mr. Sutton, and others, recognizing their usefulness, went to work with much ambition to improve them, and introduce them to the public. Mr. O'Brien has the credit of raising the first two doubles in England; they were Princess of Wales and Princess of Teck, and when exhibited at South Kensington were greatly admired. Other firms were early in the field, among them being Messrs. Sutton & Sons and James Carter & Co. Messrs. Sutton were apparently very successful in introducing new shades of color.

In 1875 John Laing gave his earnest attention to them, believing there was a grand future before them as greenhouse decorative plants. The excellence to which Mr. Laing has brought them is wonderful; we are indebted to him for what is known as the Forest Hill strain. In 1878 Mr. Laing startled the floral world by a magnificent group of seedlings at South Kensington, for which the Royal Horticultural Society awarded its Gold Medal.

Then we hear of the Swanley collection, raised by Henry Cannell, who in 1881 built a house one hundred and fifty feet long, especially for their cultivation. Mr. Cannell has been remarkably successful in raising double varieties, and has a collection of marked excellence.

We have before us a catalogue for 1893, just received from Thomas S. Ware, of Tottenham, London, and we find that in the

great begonia contest, at the International Horticultural Exhibition, in July, 1892, he was awarded the first prize, for a group occupying a space of one hundred and fifty square feet, arranged for effect. If we can judge anything from the illustration, this exhibition was truly grand. In further perusal we find that Mr. Ware has divided them into sections, as follows: 1, Mixed Single Begonias for Bedding; 2, Cheap Single Bedding varieties to Color; 3, Singles for Pot Culture; 4, Singles to Color for Conservatory Decoration; 5, Singles to Color for Exhibition; 6, Singles to Color for Hanging Baskets.

Having made you acquainted with the introducers, and the progress made by our English cousins in the introduction and improvement of a plant which has more than realized all our most sanguine expectations, I now call your attention to the progress made in our own country as far as I have been able to obtain reliable information.

My attention was first directed to the Tuberous Begonia about the year 1878, when a small packet of seed was sent to me by my father, who was then carrying on a floral business in Norfolk, Va. After very careful instructions as to how I should sow the seed, treat the young plants, etc., he remarked that he knew I should watch them with care and be pleased with the result. Being anxious to improve all I could in the style of bedding plants, a carefully selected spot was chosen for the bed of what I anticipated would be my choicest gems. Its location was near the entrance to Pine Grove Cemetery, Lynn; it was protected from the hot sun, about four hours in the middle of the day. The bed was thoroughly prepared, with about one-third each of well decomposed barn-yard manure, leaf mould, and good loam, well mixed. The plants were set out from three inch pots about June 10; they commenced to flower about July 10, and were constantly in bloom from that time until the end of the season, rivalling any bed of flowering plants in the grounds.

In the "American Florist," of March 1, 1886, Vol. I, p. 237, under the signature of "C. C.," we read that "great improvements have been made in this flower within the past few years. At all the large exhibitions in Berlin, Paris, London, etc., these begonias have been well represented, and have attracted much attention." It further says "There are many points in their favor. A compact habit, dark glossy foliage, handsome flowers in

shape as well as richness and variety of color, make them very desirable both for pot plants and bedding. Some of the single ones are of very large size, often measuring from five to six inches across; and the double ones fairly resemble well formed roses and camellias." From this time on we have seen many articles favoring their more extensive cultivation; and while we knew of their being cultivated by numerous growers in perhaps a moderate way, and more largely in the greenhouses, we have not heard of their extensive use as bedding plants until quite recently —say within six or eight years. In the "American Florist" for February 26, 1891, Vol. VI, p. 483, appears a good article with an illustration showing a house of tuberous begonias of J. F. Meech at Charlevoix, Michigan, who writes enthusiastically of the future possibilities of this charming plant.

In the number for October, 1891, Vol. VII, p. 165, a bed is shown around the house of Mrs. Robert Pitcairn, Pittsburg, Pa., which, it is said, was planted June 1, and from the 20th of that month it was a mass of flowers and foliage; it further says, all who have seen this bed admit that these begonias make the handsomest bed of flowers ever seen in this city. This bed was eighty feet long, and eight feet wide at the broadest portion. The greater part of it had full exposure to the sun, but one end was quite shaded, and this end was the poorest part of the bed.

William Falconer, (now the editor of our new semi-monthly visitor, "Gardening,") in the same issue, writes an able article upon tuberous begonias, as he saw them at Thomas Griffin's nursery, Westbury Station, Long Island, N. Y. We all bow to such authority, therefore I ask you again to listen to a very brief extract from this article: "The behaviour of these plants, as we saw them in the open air beds, was very encouraging. The main block of beds was right in the open field and unshaded by anything. The beds showed no gaps and the plants were from ten to twenty inches high and very luxuriant, with fine, bold foliage and a mass throughout of brilliant blossoms. A large mass of these begonias planted in beds slightly shaded by trees showed all the luxuriance and floriferousness of those grown in the open block and undoubtedly are far superior for such a position to geraniums of any sort."

John Thorpe, one of the best known horticulturists in this country, and Chief of the Bureau of Floriculture at the World's

Fair, is equally enthusiastic in his commendation of the tuberous begonia. He says: "I have always considered the tuberous begonia among the most beautiful of flowers; but now that a strain is produced that can be grown out of doors in full exposure to the sun, their value is incalculable. I predict for them a popularity beyond that of any flower ever used for bedding purposes."

William Saunders, Superintendent of the garden and grounds of the Agricultural Department, Washington, D. C., and Professor William R. Smith, Curator of the Botanic Garden, Washington, D. C., speak of their usefulness as bedding plants being very great. William Doogue, of our own city, says that he is convinced that they can be used as bedding plants under ordinary circumstances.

The reason that I have taken so much pains to bring to your attention the opinions of others as to the value of the tuberous begonia is, that I believe there is the greatest future before it of any plant of recent introduction, whether it is used for the conservatory, the window, or the open garden. I think one of the reasons why it is not better known is this: we have been too apt to think that it would not flourish except under glass, and have not had confidence enough to give it a fair trial as a bedder. We have grown it moderately at Forest Hills until last year; but then quite extensively, having planted out several thousands in different locations all through the grounds, in large and small beds, and on graves. In all cases they were the best beds of flowering plants in the cemetery, affording a remarkable variety of color in their flowers,— white, rose, orange, yellow, scarlet, and crimson, in numerous shades. Then a comparison between them and other flowers is a great feature in their favor. The geranium has thus far had the lead as the best bedder, but I am strongly inclined to think that hereafter the leading plant will be the tuberous begonia. I need not remind you how a rain storm destroys the flowers of the geraniums, especially the single varieties, but with the begonia it is not so; they are bright again in twenty-four hours, flower and foliage standing up in bright array, showing no injury received during the storm.

At Forest Hills we are obliged to have large quantities of bedding plants, and we wish to have the best there are going. I think a great advance has been made in the introduction of the Crozy Cannas and the Tuberous Begonias, and I hope they will

speedily take the place of the faded Coleus beds, which are not creditable to any well managed place. Perhaps other old varieties of plants will suggest themselves to you that may be dispensed with hereafter. I think there is but little character to what is usually called a foliage bed; you can go to a dry goods store and buy colored cloth that will produce as good an effect. Of course I do not include the sub-tropical beds, but only those beds which are filled with what are known as foliage plants. Flowering plants are decidedly better; what combination of colored foliage can compare with a solid mass of the tuberous begonias, or a large bed with Crozy Cannas in the centre, surrounded by a broad band of Heliotrope, with a border of tuberous begonias? A bed arranged in this way is not only an object of beauty and a delight to every one who sees it, but if you wish for flowers in the house, you have them there. The begonias are charming for this purpose; if you desire a good bed of flowers, a bright vase, a cheerful window, or some choice cut flowers for decorative purposes, you will not be disappointed in them.

Having had no experience with the double varieties, I have only made the slightest reference to them. I have used all single varieties for our purposes. We depend altogether on seedlings for bedding.

Our mode of cultivation is as follows: the seed was sown January 4, in shallow boxes, in light soil sifted fine, and covered very slightly, after which it was pressed firm with a smooth board, and carefully but thoroughly watered with Scollay's rubber sprinkler; they were then kept shaded from the sun in a temperature of 60°.

The seed germinated January 24, and many of them were large enough to transplant by February 24, shallow boxes and light soil being again used, and the plants set out about one inch apart. It is necessary that they be kept shaded for a few days, or until they are somewhat established; then they are grown in full sunlight, until the sun gets warmer later on in the season, at which time a little shade in the middle of the day will be very beneficial. From these boxes they are again shifted into other boxes which are a little deeper — perhaps three inches — and planted four inches apart. After they are established in these boxes, it is necessary that they should have all the light and air possible, so as to harden them for the transfer to the open ground, which may be made from

the first to the fifteenth of June. They like a deep, rich soil and plenty of water, as they are gross feeders. After the frost has destroyed the foliage the tubers can be taken up and gradually dried off in boxes on the greenhouse benches, where there is plenty of air and light. When dried they should be packed away in shallow boxes and placed in a dry, cool place. As soon as they show signs of growth in the spring, they should be potted in small pots and gradually changed from the small ones to those of a larger size until planting out time comes again. I believe these simple directions will serve for cultivation in the window garden equally as well as in the greenhouse.

As I wish to enforce what I have said by the experience of others, I take pleasure in calling your attention to the experience of two well known cultivators, Frederick L. Harris, gardener to H. H. Hunnewell, Wellesley, Mass., and Thomas Griffin, the large and successful cultivator at Westbury Station, Long Island, N. Y.

Letter from Frederick L. Harris.

For some years past Tuberous Begonias, both single and double, have been grown extensively as decorative plants, and also for bedding. Very few plants of recent introduction have afforded so much satisfaction, and when it becomes more generally known how easy is their culture they will be as common as geraniums. They can never become obsolete, for we have nothing equal to them for general cultivation and gorgeousness. Bedding begonias have become quite a feature at Wellesley, and the method adopted here may be of service to those desirous of engaging in their culture. In March the tubers are potted in small pots and kept in a temperature of 50°, and very little water given until they start into growth. This will be in the course of three or four weeks, when more water may be added, but with caution; otherwise decay will be the result.

About May 25, have your border prepared by being well enriched to the depth of not less than eighteen inches. Then select the strongest, and plant them about one foot from plant to plant, after which water thoroughly. They may not require any more attention, unless a very dry season intervenes, until they begin to bloom, and then a good soaking is necessary, but without wetting the foliage more than is unavoidable. Their after culture

is quite simple; stir the surface of the border frequently and top dress with well rotted manure.

The above remarks are for single begonias only. Doubles do not flower so profusely, but the weight of the flower is such that, the flower stem being weak, rain and heavy dews tend to premature decay, When growing them in pots for conservatory decoration, they certainly deserve a place equal if not superior to the single varieties. To grow these successfully, guard against over watering, although they require a generous supply, provided the pots are well drained, and filled with roots; then you may give water *ad libitum*. Do not syringe, but keep a moist atmosphere. The prettiest and most effective way to grow the doubles to advantage is in wire baskets, and when in bloom remove them to the piazza where they can enjoy a little shade. When needing water — which will probably be twice a day, in a dry time — the most simple and effective way to give it is to take a pail of water and sink the basket in it to soak well; the moss and soil then become saturated, and will not need another plunge so soon as when water is given by pouring it upon the basket.

Letter from Thomas Griffin.

As a plant for the decoration of conservatories or for bedding out, the Tuberous Begonia has few equals. The ease with which they can be grown, and the brilliant effect they produce, will always entitle them to a foremost position with lovers of plants. That their cultivation is not thoroughly understood by the majority of growers cannot be denied; but it is only a matter of time, before they will be quite as popular as the chrysanthemum, carnation, or rose. Then the price of them is within the reach of all, and the small amount of room required to keep them in winter recommends them to cultivators, even if they do not possess a greenhouse. To obtain the best results, you should lay the foundation by starting with a good strain, for a poor one will never give satisfaction. The varieties that have well formed and round flowers, thrown up well above the foliage, are much to be preferred, especially for bedding purposes. There are a few sorts which have immense drooping spikes, that present a very graceful appearance when elevated on a pedestal, where their great beauty can best be appreciated, for that is the only position where

they can be seen to advantage. A house devoted entirely to them, with a few nice palms and ferns to relieve their glowing colors, can be better imagined than described, and is well worth a long journey to see. There are now varieties with such delightful fragrance as still adds to their attraction and gives them the final charm.

Having grown them in England, and for five successive seasons in this country, enables me to speak practically on the subject. We grow them here by the acre, which gives us a good opportunity for testing their adaptability both for out-door and conservatory decoration.

They are easily raised from seed, sown not sooner than the middle of January nor later than the end of February. They have then plenty of time to make strong plants, fit for planting out by the first week in June. They should be sown in leaf mould sifted very fine, and grown on in a temperature of about 70°, gradually hardening them off previous to planting them outside.

The soil should be made very rich, for they should grow without any check from first to last. Choose an open position where roots of trees or shrubs will not rob them of food or moisture, for they cannot survive such deprivation. If they can be shaded for two or three hours during the hottest part of the day so much the better. The east or north side of a house or other building I consider the ideal place for them, though I have grown them by thousands in the open field without any shade from trees or buildings. I consider a little shade beneficial, especially in such a summer as the last. They delight in plenty of moisture, and, therefore, should be mulched with short manure or cocoanut fibre refuse, which helps to retain it, and prevents the ground from getting hard, which frequently occurs from watering them, and also by heavy thunder storms.

Plants from tubers are much preferable to seedlings, especially where immediate effect is required; they also make much larger plants. They should be started into growth by placing them close together in shallow boxes or under the benches, in a temperature of about 60°, and slightly syringed once or twice a day. It does not matter whether or not they have any soil at this stage, but as soon as growth commences they must be brought to the light, and every encouragement given them to grow sturdy and strong.

They must not be coddled with too much heat or moisture, especially if required for out-door planting later on; for the leaves will be too thin to stand the weather, and consequently, will burn easily, thus giving the plants a check and spoiling their beauty. About the first week in March is a good time to start them for bedding purposes, giving them plenty of time to make plants by June, and is much perferable to starting them later and hurrying them on in heat.

If required for the conservatory they should be started in the same manner as advised above, and be potted on as they fill their pots with roots. Ten or twelve inch pots are large enough for the final shift, and by feeding them with liquid manure when the roots are running thickly round the pots they will continue to grow and flower for a great length of time. It is very essential at all times that they have good drainage, for though they like plenty of water while growing it must never become stagnant about their roots.

Good, turfy loam, with one-fourth short manure well mixed with it, will grow them to perfection. A little bone-dust may be added, but all patent fertilizers must be avoided; the chemicals contained therein are apt to have a decaying influence on the tubers. Liquid manure from either cow or horse dung, well diluted and used clear, is both safe and beneficial.

If grown under glass they must be shaded to prevent the temperature running up too high, and ventilation, both top and bottom, with the floors damped once a day, will suit them admirably.

Discussion.

Henry Ross said that Mr. Barker's paper had interested him very much, because it was so practical and straightforward in stating the views of the writer. But he could not agree with all that had been said. He thought Mr. Barker's remarks too condemnatory of the use of foliage plants and foliage beds. If anything is beautiful and gives pleasure and satisfaction, it is a bed of foliage plants. The difference in opinions leads to discussion, and that is one object of these meetings. He did not care to see too much foliage bedding, but if such planting were done away with, he would consider it a great loss. Mr. Barker gave

him some tuberous begonias, which he planted out, and he was much disappointed in the result, but he found that he did not cultivate them rightly; he did not make the ground rich enough. He went to Forest Hills to see how the plants succeeded there, and was delighted with what he saw. But he would not have geraniums discarded; they grow quite evenly, and if any inequality appears, the plants can be trimmed into shape readily. The begonia is apt to send out strong, one-sided shoots, which give the bed an irregular appearance. Mr. Barker had given to him a large number of plants of tuberous begonias, which he proposes to plant out in the coming season, and hopes to grow them successfully this time.

E. W. Wood referred to the quotation from John Thorpe, of Pearl River, New York, as given by Mr. Barker, and then asked if the difference in tuberous begonias, as to ability to bear full sunshine was peculiar to certain varieties. He then remarked that the tuberous begonia was a recent child with Mr. Barker, which accounts for his enthusiasm in its favor. He further stated that as a testimony in support of the continued use of foliage plants for bedding, he would say, that the handsomest ornamental bed he ever saw, was one filled with foliage plants, at Pine Grove Cemetery, of which Mr. Barker then had charge; and Mr. Wood believed that Mr. Barker designed and directed the planting of that bed.

William Stone, Superintendent of Pine Grove Cemetery, Lynn, spoke of some beds of tuberous begonias which he planted; one was where the shade of an elm tree fell upon it during two or three hours in the middle of the day; another bed was in the full sunlight except at the latter part of the day; both were beautiful, and gave entire satisfaction. He agreed entirely with Mr. Barker as to the brilliant future in store for the tuberous begonia. He also endorsed the praise given to the Crozy Cannas, of which he has one seedling which he considers superior to the parent. He said geraniums had been the most popular bedding plants during so long a period that a change was very desirable, and the present excellence of the begonia is such as to give it great popularity. But it is possible that we shall some day wish to go back to geraniums; in fact, while we enjoy the new we also wish to retain the old for variety of material. In reply to a question, Mr. Stone said he used mostly the single-flowered tuberous begonias.

Edward L. Beard said the tuberous begonias had been known a long time. His interest in them dated back sixteen years, and he had spent considerable money in importing and experimenting with them. But the interest of amateurs is more important than that of professionals. He was convinced that amateurs would find them more or less disappointing, for these reasons: first, that it is difficult to keep the tubers over winter under ordinary conditions, and, second, if planted in the open ground dry, as early as possible they will not come into bloom until the middle of August, and possibly as late as the first of September, giving a very short season of perfection of bloom, if indeed the flowers come to make a satisfactory showing. Therefore, if one has no greenhouse or other effective means of starting them early in the spring, which is necessary to bring them into flower soon after being planted out, there will be a great opportunity for disappointment. He did not wish to throw discredit upon them, for he esteemed them, in perfection, just as highly now as he did sixteen years ago. He would not deny their effectiveness when started early in a greenhouse; but who can start them thus early without a greenhouse or some other suitable means, which the average amateur does not possess? Without a suitable place to dry them off, and to keep them afterwards until the time to start them in the spring, they are very apt to suffer from either wet rot or dry rot, if not injury from a chill.

Mrs. P. D. Richards inquired if the tuberous rooted begonia could be successfully grown as a window plant.

Mr. Barker believed this class of plants to be excellent for the window garden; but after their summer growth in the garden they must be dried off and have a period of rest. However, if they are started late and have been in flower but a short time before being lifted for window culture, they might prove of use at that time. But even the commercial grower has not yet awakened to all the possibilities of the tuberous begonia, although they can grow them freely for summer use. He would be suspicious as to any success in flowering with tubers planted dry in the open ground. They can be started in a window successfully. Mr. Barker called upon Mr. Westwood, his assistant, to state how many geraniums and how many tuberous begonias they had on hand. The reply was, "Fifteen thousand Tuberous Begonias and forty thousand Geraniums." Mr. Barker then said there

would be some foliage beds, as well as geranium beds, besides tuberous begonia beds in the grounds; that his remarks upon these three indicated their present comparative importance in his estimation, but that the first two, especially the first, would have their places in less conspicuous parts of the grounds than they have held in the past, while the begonias would be the leading bedding plants. He added as another recommendation of the last, that at any time it is easy to lift plants and set in new ones, or transplant them in order to make the beds more even.

Mr. Stone said he wintered his tuberous begonia roots on shelves in his potting house, over the boilers, where they get very dry. Many of them are now reminding him that it is time they were potted, as they have begun to grow. These plants are more satisfactory than some others, as they can be easily lifted and reset without suffering a check upon their growth.

A lady stated that she planted dry bulbs or tubers in the ground in the spring; that they grew well, and produced flowers in August and to the end of the season. When early frosts came she covered them with papers. Some of the flowers on her plants were five inches across.

Mr. Beard could not believe that any considerable show of flowers could be had before the first of September,—or at best the end of August—from tubers that were planted dry in the ground in the spring. If possible, it must be in a spot highly favored in location. He believed they could not be planted dry like dahlias, and produce a satisfactory show of flowers through the season.

Mr. Barker said the people must be educated before they can be successful in the treatment of plants of any kind. Tubers can be bought and planted in shallow boxes, and started in a sunny window. In reply to a lady who asked about starting the tubers in the pots and soil in which they grew the previous season, Mr. Barker said the tubers could possibly be kept over in the pots in which they grew, but on starting them again the old soil should be all taken off, and fresh soil used, else the tubers would be liable to decay. The tubers should also be planted first, in small pots. He then called upon Thomas H. Westwood, gardener at Forest Hills Cemetery, to state how to treat the tubers in winter.

Mr. Westwood said that anyone who could keep a dahlia during the winter, could keep a begonia tuber. In lifting them

from the bed a good ball of earth is taken with each one, and carried into a dry, cool place, where no frost can get at them, and they can be thoroughly dried. During January and February this earth is all shaken off, the tubers are cleaned, then put in sand, in shallow boxes, and placed under the benches of the greenhouse. They are thus kept dormant until March, when a little more heat and judicious watering are given, which starts them growing. When a little growth is made they are transferred into boxes at least three inches deep, with nice, light soil. From these boxes they are transplanted into the open ground. Seedlings can seldom be successfully raised by amateurs, as the appliances as well as the skill of professionals are required to secure success.

Jackson Dawson was called upon, and said he had no experience in growing begonias, but had noticed that Mr. Sargent was very successful in their production and treatment. He understood that they were started in March and April; that they were put into cold frames as soon as it was safe to do so, and from those were planted out in the open ground. When bedded they make a perfect mass of bloom, which is kept up until frost comes, and he regarded them as the finest and best bedders we have, especially in a shady position.

President Kidder spoke of the inexcusable practice of some persons, who, after the frost has cut down their tuberous begonias, merely take out the roots and rake over the beds, leaving them in such a desolate and unsightly condition not only through the winter, but also until the time to plant begonias again. He suggested that with our great variety of evergreens a fine winter effect might be secured, or at least the beds might be filled with hardy bulbs for a bright display in the spring.

The President announced that on the next Saturday, James Comley would give an account of his observations in Japan, during his recent visit to that far-off and interesting country.

BUSINESS MEETING.

SATURDAY, March 25, 1893.

An adjourned meeting of the Society was holden at eleven o'clock, the President, NATHANIEL T. KIDDER, in the chair.

The Secretary being absent by reason of illness, Miss Charlotte M. Endicott was appointed Secretary *pro tem.*

No business being brought before the meeting it was dissolved.

MEETING FOR DISCUSSION.

A Visit to Japan.

By James Comley, Lexington.

Some thirty-five years ago, in 1858, I unpacked the first two cases of plants ever imported into the United States from Japan. These comprised the *Lilium auratum*, and six varieties of Retinospora grafted on one stem, which had been cut from the main trunk and placed in damp soil to preserve the grafts. I thought this so singular that it aroused my curiosity, and since that time I have always had a desire to visit the Country of the Rising Sun. Therefore, when in the fall of 1892, Francis Brown Hayes, Esq., proposed a trip to that interesting country and invited me to accompany him, you may be assured that I was very much pleased to have the opportunity. Now, after my visit, I feel that I must go there again before I shall be satisfied, yet I shall never forget the pleasure afforded me through the kindness of Mr. Hayes on this occasion.

We left Boston October 5th, and proceeded to New York, where we arrived on the 6th. When we reached the metropolis, great preparation was in progress for the celebration of the Columbian anniversary. I took a flying trip through Central Park and the place was beautiful, causing me to feel that the people who could not admire the scenes around them there must be indeed dead to all sense of the grandeur of Nature, but everyone seemed gay and to appreciate that which had been prepared for their enjoyment.

We left New York for Chicago the same day, arrived in the Windy City at 9.30 P. M. on the 7th, and reached Council Bluffs on the 8th. Between Chicago and the latter city we passed through vast tracts of cultivated land. There were fields of corn reaching out as far as the eye could carry, with farm-houses half a mile to a mile apart, and these were surrounded by Eucalyptus trees, planted there for shelter. Occasionally we passed through large cattle ranches containing from five hundred to a thousand head of cattle in a herd. But beside these there were great horse ranches with hundreds of animals of all ages running about.

We reached Humboldt Wells on October 9th, and after passing that place came in near view of some of the many wonderful natural phenomena with which our country abounds. Among the most striking of these were huge stones cropping out of the sides of the great mountains and standing clearly and heroically by themselves, fifty to one hundred feet in height. Probably these are the results of volcanic action, but certainly I had never before seen anything so strangely peculiar, towering heavenward as they did.

After leaving Humboldt, we came to a tract of land hundreds of miles in length, in going through which we passed what seemed to be an endless line of vineyards, where the fruit was being prepared for raisins. But in addition to these there was an abundance of apricots, almonds, plums, pears, and all kinds of small fruits. These great fruit orchards were to be seen all the way to San Francisco.

We arrived at the latter city October 10th, after a very pleasant journey. The weather being good all the way afforded us an excellent opportunity to view the beauties of the country through which we passed. So vast did this seem that one could not help thinking you could put the whole European continent down here and yet have plenty of room to grow food and fruit sufficient to supply the world. One ranch which we passed through was at least twenty-five miles in width, with intervals where men were engaged in baling hay for Chicago, and the crop was at least a ton and a half to the acre.

At San Francisco we stopped at the mammoth Palace Hotel, one of the largest and most superbly fitted up establishments of its kind in the world. When walking along the street I noticed a cable car marked "Golden Gate Park" and I at once determined to visit that place, which was reached after a ride of some two miles. I enquired for the superintendent, but that gentleman was not found at this time. However, I met Mr. J. H. Gordon, the second superintendent, who was formerly gardener for Mr. Sturtevant of Roxbury, and who showed me much consideration. We visited the palm house, where there are some magnificent specimens of almost every kind of palm in cultivation. Hanging from the roof was a grand old *Bignonia venusta* in full flower. In the stove house was a marvellous collection of orchids in bloom. From this house I was escorted to the tropical fernery, where there

was a large number of huge baskets hanging, many of which contained scarce and valuable specimens. In a tank in the centre was the *Victoria regia*, the queen of water lilies, in full bloom and bud,— a very fine plant. We passed through other houses containing large and miscellaneous collections of plants, all well worthy of inspection, and I could only regret that my time was too limited to make a more extended examination. Truly these houses reflect credit on the gentlemen in whose charge they are. The site of the park is an undulating tract of ground, just such as an ornamental gardener would desire, and certainly it has been well arranged. Through the centre there runs an avenue some four miles long and from forty to fifty and one hundred feet in width. In this park, the gentry of San Francisco, as a part of fashion's programme, disport themselves every Thursday in elegant equipages drawn by handsome horses, and there I saw some of the handsomest turnouts ever shown. This park is probably the finest in the world, the climate being greatly in its favor for growing tropical and sub-tropical plants. The main avenue leads to the Cliff House, from which there is a grand and expansive view of the noble Pacific Ocean. It is here, too, that we find the renowned Seal Rock, so often alluded to by travellers, where the seals go daily by hundreds to bask in the sun, and a very pretty sight it is to see these harmless creatures as they lie there sunning themselves. As one goes through the park he cannot but admire the acacias, veronicas, and the tacsonia as it hangs from tree to tree, with ferns and palms at intervals. Indeed there is almost every variety of fern known to the connoisseur and they seem to thrive wonderfully. Tea roses, such as Safrano, Maréchal Niel, and Souvenir, and Himalayan Rhododendrons are abundant and in fine cultivation. Shrubs of all kinds are in profusion. One very attractive piece of work was a sun-dial formed of growing plants, which, by an ingenious arrangement of the gardener is made to show the time of day. In the rear of this was a bank of flowering plants and the general effect was as pleasing as it was unique. No less than one hundred and fifty men are employed all the year round in attending to this immense park.

My first visit to this earthly paradise had given me so much pleasure that I improved the opportunity on my return to renew acquaintance with it, and then I had the pleasure to meet Mr.

McClennan, the superintendent, who paid me every attention and drove with me through the park, pointing out objects of interest and explaining his plans for the future development of this Arcadia. The land all around San Francisco is so fertile that it requires no stimulus other than a sufficiency of water to produce the best results, and the water used in this park is all procured from artesian wells, being pumped up to the high grounds.

While here I took occasion to visit Sutro Heights, the seat of Adolphus Sutro, the many times millionaire, whose place adjoins the park. This is one of the most lovely spots that could be imagined, with fine trees of every kind,— *Araucaria Milleri*, *A. Cookii*, *A. Bidwillii*, etc. Dracenas and palms are numerous and all good specimens. Close at hand are the public baths, a grand institution, open free to everyone.

On October 12th, I visited Sherwood Hall, the property of Timothy Hopkins, another elegant place, or rather a place which ought to be one of the finest in the country. But I was shocked to find so fine and noble a house and grounds turned over to commercial uses and the beautiful flowers being sold as if this was no more than an ordinary flower market. Here are some of the finest floral specimens to be found anywhere, with splendid palms, agaves, and other plants. The lawns through the grounds had been broken up and violets planted everywhere. Indeed, I was told that more than eight acres were planted with nothing but violets, six acres with chrysanthemums, and four acres with sweet peas, and pinks and other marketable flowers in like proportion. The Hall had evidently been a grand place when properly cared for, but it is sorrowful to see everything running to decay as it now is. Scattered round the extensive grounds are numerous vases which have cost fabulous sums of money — some as much as five thousand dollars each; and beside these there is quite a large collection of statuary, representing thousands of dollars spent, now all going to ruin.

At the railway station near Sherwood Hall, I saw specimens of *Agave Americana* thirty to forty feet high in flower.

On the day following my visit to the latter place I went to look over one of the great vegetable farms so numerous near San Francisco. There was every sort of known vegetable, and strawberries in profusion. This farm is ten acres in extent, and seemed to be literally dotted over with windmills used for

pumping water from artesian wells, irrigation being the only thing necessary to promote growth, thus confirming what I had previously been told. Indeed it is almost impossible to believe the wonderful stories told of the prolific nature of the soil.

In the evening I had a ramble through the famous Chinatown of San Francisco, taking a guide with me. There I saw such sights as would disgust any person who has respect for his kind. The abodes of these people are simply hovels, and they herd together more like swine than human creatures. Their principal enjoyment consists in opium smoking, while vice is openly carried on, the residents being devoid of all shame. They are allowed to live in this loathsome manner simply because they pay exorbitant rents for the hovels they occupy, out of all proportion to what they are worth. On the top of the shanties they live in, these Mongolians sell Chinese goods and do a thriving trade.

We sailed from San Francisco for Yokohama on October 15th, in the steamer Peru, Captain Ward, of the Northern Pacific Steamship Line. The voyage was a very rough one and I suffered dreadfully from that old enemy of the landsman, sea-sickness. The wind blew from the north-west all the way across and so we were twenty days at sea, allowing for the difference of time, and nine of those days I was too ill to eat anything at all. The officers of the vessel did all they could to relieve the passengers, and were courteous and obliging at all times. Although a very young man, Captain Ward proved to be a capital officer and knew how to command. The weather was so very rough one night that I was violently thrown from my berth to the state-room floor, and the officer of the watch hearing my fall came to the door to enquire as to the port-hole window, which he thought had been blown in, the noise was so loud. Others again thought that I must have received serious injury by the fall. Fortunately there were no bones broken, but I was terribly sore when I picked myself up, and very soon after I was covered with black and blue marks where I was bruised. However, I got over everything all right and was glad to arrive at Yokohama, all well, on November 3d.

To an American or European the first sight of Yokohama is at least interesting. In the background there rises what might seem a forest of trees, for every street gives its quota to the scene, being full of foliage. At the wharf our first astonishment was not to see any horse cars or other carriages such as we had been

accustomed to, but in their place were a lot of curious looking vehicles called rikishas; they are drawn by men who are generally clad in grey or blue clothes of light texture, and in their own tongue or broken English they ask, "Will you ride, Mister?" How hardy these men are none can tell until they have had experience; it is no uncommon thing for them to run forty or fifty miles in a day, and then they come in smiling as though they had not over exerted themselves. They are always cheerful and are glad to get a sum equivalent to fifteen cents an hour. But beware how you treat these poor fellows, for if you try to run them down, to use a Japanese expression, your name is mud. While they will work hard and honestly for you if you treat them well, they will carefully shun those who attempt to take advantage of them and wherever you go in Japan after once ill-treating the jinrikisha man, you will find that your character is known, be it hundreds of miles away. But be honest with them and no better servants ever lived; they will draw you eight or ten miles an hour without a murmur. Horses are seldom seen here except in the carriages of the grandees. The rikisha is the common vehicle and there are thousands in every city. There was no choice and therefore we had to take one of these peculiar vehicles to get to our hotel, the Grand, which is carried on in European style. It is the finest house of its kind in Japan. The servants are all native but they are well trained. In this house the guest can obtain anything he desires, even to home dishes,— Boston baked beans among them.

We arrived at the hotel about ten o'clock in the morning, and after lunch had a look round this city of temples and gardens, and let me say here that everyone seems to have a garden, if it be only in a backyard. I shall have something to say about these later.

While I was in Japan I assure you I made the most of my time; every morning I went out prospecting and so gained much information.

In Yokohama I visited the establishment of Louis Bœhmer & Co., nurserymen and florists, No. 28, Bluff. Mr. Bœhmer very courteously invited me to "tiffin," which I may explain is the Japanese term for lunch. Afterwards he showed me through his extensive grounds and greenhouses. I was very much surprised to see everything in such perfect order, with plants and shrubs of all kinds at their best. Many noble specimens were growing in China vases which were hundreds of years old. There

was also every variety of plants for house or lawn decoration. Here I found a good collection of chrysanthemums of many varieties, but only one which I thought to be extraordinary, and that one I secured. I also obtained a great many valuable plants of other species from the same firm, many of which have arrived, and more are to arrive in April. I was much pleased to meet Mr. Bœhmer's new partner, Mr. Alfred Unger, who was exceedingly attentive to me. This gentleman is a young German and he promises to be a valuable addition to the firm. He is polite, active, and a good business man of considerable knowledge.

From the windows and the veranda of the hotel we could see miles across the bay, with steamers coming and going all the time. Looking to the right there was a magnificent hill covered with foliage, on top of which was a large temple, which I visited early in the morning. As I approached the steps I saw two young maidens who appeared to beckon me to enter. Here I was taught my first lesson in Japanese manners. Judge my surprise when I reached the steps and one of the young girls seized my right foot, and the other took hold of the left, each offering me a slipper to put on. I took my boots off and put my feet into the slippers, which they assisted me to do. Then they bade me enter the temple. I was at once astonished and delighted by the magnificence of the interior. The whole building was surrounded with sculpture of every imaginable kind, representing men, animals, birds, and flowers, all executed in the highest style of art. The whole scene was solemn in the extreme. Leaving this temple I could not avoid noticing two large trees, which proved to be Ginkgo trees, about fifteen feet in diameter and one hundred feet in height to the lowest branches. The effect of the trees, one on each side of the entrance, was grand.

The Cliff Gardens, Yokohama, form only one of many pretty spots near this interesting city; it is a beautifully laid out piece of ground, large in extent and open to the people at all times. There I saw dwarf figures composed of chrysanthemums representing all kinds of character. Here are some elegant specimens of the *Camellia Japonica*, in every shade of color. These composed a hedge of flowers twenty feet high and six feet through, extending about five hundred feet in length. It was really a sheet of flowers when I was there. Then close beside was the *Daphne*

odoratissima eight feet in diameter and full of buds; also beautiful specimens of the Umbrella Pine (*Sciadopitys verticillata*) and other Pines and Gardenias.

While there I paid a visit to the Yokohama Gardeners' Association's grounds, Nos. 21 to 23 Nakamura Street, and there I saw the floral and nursery business carried on in the most perfect manner. This establishment covers two hundred acres of land, including greenhouses and stores too numerous to mention. Palms, pæonies, plums and cherries, evergreens, and all classes of shrubs in cultivation — also magnolias, are here. Besides all these, there are hundreds of thousands of dwarf trees from five to five hundred years old. Truly this is the most beautiful collection of its kind in the world. The chrysanthemums were grand, from six hundred to eight hundred varieties being on view. Among these were about seventy altogether new varieties, which I obtained,— all wonderful in color and shape. The gardeners, although unable to speak more than a few words of English, readily understand when you appreciate their work of cultivation. I visited their gardens several times and was most courteously received. They are great seedsmen. Most of their plants are growing in bamboo baskets or glazed pots so that they are ready for removal at any time. They are dwarf, well rooted, compact plants of all growths.

I visited every place of note in Yokohama where I might expect to find a chrysanthemum, and discovered one or two new varieties in each place. These I generally obtained on the spot, though this is not an easy thing to do at all times. It is impossible to purchase from the gardeners of the gentry. The latter are dignified with the title of noblemen and stand high in the esteem of the people, while they are as proud as the most ancient of the British nobility, and would refuse to sell anything which they have in their handsome grounds. It is, therefore, necessary in some way to become intimate with the gentlemen themselves or to placate the servant. To do this of course one has to use his brains, and a little stratagem when desirous of securing specimens in their possession. Above all else it is necessary to satisfy these people that the transfer is purely a matter of friendship and that you have no intention to use the plants for commerce or otherwise than for your own private collection in another country. They object to all commerce when the garden is concerned, and will not sell even to the dealer of Japan.

In this way I visited nearly one hundred places in Yokohama and saw scores of old and beautiful plants which money could not purchase.

From Yokohama I went to Tokio, the capital of Japan and the residence of the Mikado, with its many temples and grandly wooded grounds, filled with children at play and dapper little mothers, themselves scarcely more than children in appearance, carrying their infants on their backs as though they had no weight; joking and gossiping with each other, the happiest mortals in creation. The palace of the Mikado is a large and handsome structure surrounded by most beautiful grounds. But beside this, there are in Tokio many gardens scarcely inferior; all contain most curious trees and shrubs and are carefully kept. Here I saw one of the best collections of chrysanthemums in Japan. The Imperial gardens are difficult of access; indeed, there is no admittance at all when the Mikado is residing at the palace. However, I managed to obtain the favor of a sight of this great home of the Japanese flower, and feasted my eyes on a vision of beauty for a brief space.

Tokio abounds in elegant parks and drives, and possesses a fine museum which would put to shame many of those seen in Europe. In the great park may be seen almost every animal known, with birds and monkeys innumerable. The Imperial Botanical Garden, is one any country might well be proud of, for there is to be seen one of the largest collections of named plants in the world. While there I met a botanical student with whom I entered into conversation, and he informed me that there were no less than eighteen thousand named varieties in these grounds. He pointed out some beautiful spots laid out in an artistic manner. There were many beautiful palms, and other trees, shrubs, and greenhouse plants.

Dangozaka, the great chrysanthemum garden, is about fifteen minutes' walk from the Uyeno Park, and is situated on the slope of a hill. In this place it has been the custom, from the days of the Tokujiro Shoguns, to arrange chrysanthemum flowers deftly, to represent notable persons, birds, or animals, or to tell of some event in history. As the visitor approaches from the street, flags and banners seem to invite him, and the showmen tell of the great skill they have to show. The visitor pays the fee, a few "sen,"*

* Nine of these coins equal one cent of United States money.

and is led forward by a man who explains the allegory. The costumes of the figures are composed of chrysanthemums; the faces are carved in wood or plaster, the whole being realistic in appearance. The construction of these models is most interesting. First a frame of bamboo of the required size, is made, and the plants, growing in pots, are arranged in the rear of this frame in such a manner that neither stems nor pots can be seen from the front. Then the blooms are drawn through and arranged in artistic fashion among moss on the front of the frame. These models last for about a month, and old and young go to view the show, which is considered one of the great events of the year. Other places which I visited in this vicinity are Megura, Asakusa, Simei-Iriya, Hanka Yen, Senzokumura, and Kusubun-at-Honjo.

On Sunday afternoon, after visiting the chrysanthemum show, and when about half a mile from the palace, I came across a vast concourse of people who were evidently holding a celebration of some kind; there must have been sixty thousand men, women, and children. Horse racing, dancing, and all kinds of games were in progress, and everyone seemed to be delighted. As I got near to the crowd I was surrounded by a host of happy, smiling, little girls who seemed to think I was a modern Gulliver, for they greatly admired my size, which is much above that of the average Japanese. I could not but remark how pretty these little dolls were in their nice, silk dresses, with their hair tastefully braided. In all my experience I never saw so orderly a crowd. There was no jostling or hustling, but all seemed to be willing to help each other enjoy themselves.

I found many curiosities and novelties in Tokio, and that Sunday afternoon as I stood watching those people at play, I procured one of my finest specimens from off a handcart. But it was not until I had done a great deal of talking that I could persuade the man to sell it to me.

In Tokio I came across the lotus gardens, covering seven acres of land. The Lotus is highly prized by the natives. To them it is the symbol of purity, as it grows in the mud but brings forth a lovely flower. A good man, untarnished with the vices of his friends or contemporaries, is called "Deichu no nachisu," or a lotus in the mud. The flower represents, secondly, virtue, as its fragrance sweetens the air in its vicinity; thirdly, it represents single-mindedness, as it has no branches, and fourthly, it represents usefulness, as its root is edible.

From Tokio I went to Nikho, another great city, which stands on the rise of a hill, and is noted for its magnificent temples and its picturesque situation among a range of exceedingly high hills. For a man who loves Nature there could be nothing more delightful than to roam among these mountains, clad as they are with such a wealth of foliage of all shades. These mountains extend for twenty miles, and every step reveals some new wonder. It would be impossible were I to attempt it, to do justice in words to this grand scenery. When I was there all creation seemed to wear its best garb. The trees were all in handsome foliage of every hue; the maples were perfectly magnificent, while palms, rhododendrons, azaleas, hydrangeas, honeysuckles, weigelas, and deutzias, were equally grand, all growing spontaneously together. Hydrangeas, in great variety, over twenty feet in height, were to be seen growing wild. On one mountain side there were twenty-four varieties of shrubs growing in a space of twenty-five feet square. These were so thick that it would have been impossible to get through them. I felt that I should dearly like to spend years in the study of the many grand plants on these mountains, being sure that there were among them many novelties, yet undiscovered by us. On one occasion I came to a grand waterfall on the mountain side, the top of which was a crevice some four hundred feet high. At that time I was being carried in a basket on the shoulders of four men. It was impossible for even the accommodating rikisha to get along here; the foothold was not more than three or four feet wide in places. These men are so accustomed to carrying people up the mountains that their step is as sure as that of a goat. So I was carried up eight or ten miles. The effect of the landscape was glorious in the extreme. In one place two hundred feet below a waterfall, I saw a bush at the foot of the ravine, covered with bright red berries, and at the risk of a fall, I climbed down to see what it was. I found it to be a Barberry bush, but surpassing anything I had ever seen before for the brilliancy of its color, which was a dark carmine or crimson. This was the only plant of its kind I saw, and I procured all the berries or seed. I planted them at home and am glad to say that they seem to be doing well. Near this place there is a Japanese tea-house, an accommodation common all over the country and which takes the place of our own roadside hotel. To this some friends with myself had previously forwarded

substantial refreshment, and a rest and a bottle of lager beer were very enjoyable, with the cool breeze coming from a large lake close by; we were then up some four hundred feet high. This lake is several miles in extent and feeds the waterfalls. One would wonder how so large a volume of water could be gathered from the hills at such an altitude, although the range is from two thousand to four thousand feet in height. On another occasion four jinrikisha men carried me up these mountains, and I picked about one hundred varieties of seeds from plants growing there.

Near the temple of Nikho I saw some fine specimens of *Cryptomeria Japonica*. One morning, going out early, as was my wont, I came to a tea-house, and there saw growing in the yard a magnificent collection of chrysanthemums. There were four pretty Japanese girls sitting on the veranda of the house, and I asked permission to step in to look at a particular flower more closely. At first they seemed afraid to allow me to enter, but soon they not only invited me in, but handed me tea in one of their tiny cups. I praised the flowers and they seemed pleased and offered me some of them. The young girl who seemed to own the flowers, took up the specimen I most admired, retaining only a side shoot for herself, and that she planted where the other had been. I was pleased to get the plant and offered to pay for it, but this she would not listen to, saying she was much pleased to give it to me, and in the hearty fashion of the country told me to call again. In the meantime she had asked my name and gave hers in return, which was Toh Me. I promised to go again in the evening, seven o'clock being agreed upon as the time. Accordingly at that time I went again, but then I was accompanied by some friends who were equally desirous of seeing something of the inner life of the people of the country. When we got there the girls seemed astonished to see that I was not alone. I soon put them at ease, however, by saying they were my friends. Slippers were handed to each, and when we had put these on we stepped into a dainty little room, and tea and supper were handed round. After the ladies had taken a whiff of tobacco from one of their tiny pipes, without which no Japanese girl could exist, they retired. Presently a screen was drawn back disclosing an adjoining room into which directly after, the girls all stepped, but dressed in the flowing dancing costume of the country. Two of the girls sat down in separate corners of the room and played

on the peculiar musical instruments which they use, singing at the same time. The other girls then commenced to dance. But what dancing that was! The highly paid premier dancers who come here year by year from Italy and France, do not compare with these girls in ease and grace. The dance of the Japanese is in itself a poem. It is always intended to represent some phase of life, and is readily interpreted by those who have lived there any length of time. We spent two hours very pleasantly here, an old lady handing round refreshments as the entertainment progressed, and when we left it was with the request to come again.

From Nikho we went to Mineosta, then to Shidyawa and Yogoya, finally arriving at Kioto, where we stayed a week. This is one of the finest cities of Japan, and it was here we found the best chrysanthemums. They were to be seen in every garden, and I secured some very handsome varieties, among which are many of an entirely new class. Here I visited some of the great rice farms and the noted orangeries, together with some of the great mountains. This place, like all Japanese cities, has many handsome temples; and one, which is in course of erection, has already cost over $6,000,000. It is a most wonderful structure, with immense arches enriched with delicate carving of every conceivable kind, including many floral designs of most poetical conception. Around this temple again are shrines erected to the memory of departed friends, and these are equally elaborate in their decoration.

On one of the farms near here, I saw no less than eight acres of *Lilium auratum* bulbs and five acres of *Caladium esculentum* roots, sweet potatoes, buckwheat, and four acres of lotus. The farmer claimed to have thirty varieties of lotus and I secured some of each, although the nurserymen and city dealers do all they can to prevent strangers dealing directly with the grower.

In another place I saw six acres of pæonies of all ages, and three acres covered with young plum, cherry, and peach trees in all stages. These were being grown for shipment. Persimmons were plenty and mulberry trees were grown by the acre. The latter were cultivated for the rearing of silkworms, which is a great industry in this neighborhood. In the ravines between the great mountains here, the ground is perfectly yellow with the fruit of orange trees.

While I was in Kioto I went to Sacco, about one hundred miles distant, to visit the finest chrysanthemum show in Japan. Sacco is a very large city, all laid out in squares, the streets running in perfectly straight lines for four miles, from north to south, each from fifteen to twenty feet wide, with equally straight cross streets. This arrangement gives the place a very neat appearance, the houses being low and built closely together. In the show there were thirty different classes of chrysanthemums, all arranged in booths built of bamboo, each class by itself. Specimen plants were grown in almost every conceivable shape, showing remarkable skill in cultivation, four or five kinds being grown in one pot, and trained to make a perfect pyramid of flowers of different colors. Few people can realize how surprised I was to see this marvellous display, after all the many wonderful shows I had seen in Japan. The varieties and classes were perfectly gorgeous, and so grand that I could not have believed such an effect possible. After a careful examination and deciding in my own mind what I should like to take away, I asked if I could purchase any. At first I was refused, but after considerable talk and when I had convinced the people that I wanted them for private use and to take out of the country, making a solemn promise to that effect, I was told I might have some. I began to point out such as I should like from those in the exhibition, but I was told that I could not take any of those on view, but must select from others growing on a plot of land in the rear of the exhibition, where there were the same varieties in the open air. Imagine my further astonishment when a bamboo gate was opened and I saw over a quarter of an acre of land literally covered with plants, all named, two or three of every kind and more of some. Many of these plants were from seven to eight feet high, with flowers from seven to fourteen inches in diameter. The gentleman who owned the place was old and feeble, and his wife sent the head gardener to accompany me while I made my choice. I went over the whole place row by row to all the classes and when I had got through I had no less than one hundred and seventy-five varieties. I returned to Kioto very much pleased as you may suppose, and hastened to Yokohama once more to get my treasures safely started off for Boston. I had by this time gathered in all about four hundred varieties of chrysanthemums, beside other plants. Among these were one hundred varieties of maple, seventy-five

varieties of tree pæonies, fifty varieties of herbaceous pæonies, fifty varieties of plums, fifty varieties of cherries, fifty varieties of flowering peaches, six varieties of hydrangeas, one of these being the rarest plant in Japan; numerous varieties of ornamental trees, some of which are fifty, one hundred, and two hundred years old, with twenty varieties of lilies, besides lotuses, rhododendrons, azaleas, magnolias, evergreens in great variety, wistarias, citron and orange trees, and six varieties of bamboo. Some of these I brought with me and the remainder I expect to arrive next month.

I left Yokohama on my return journey November 29, again sailing in the Peru, after I had seen all my plants on board. One palm I carried aboard in my hand and brought in my stateroom, along with a pretty little Japanese dog, which some friends had given me while in the mountains. We had a pleasant voyage and I arrived in San Francisco in fifteen days. After seeing my plants on the train there, *en route* for Boston, I remained two days in that city. I then left for Pasadena by the Southern Pacific route, and there I stayed at the magnificent Raymond Hotel, which is under the management of Colonel Wentworth, who was formerly at the White Mountains. This hotel is situated on a hill with vast mountains on the one side, and a valley extending for miles on the other. For many miles before you reach the hotel this huge mountain can be seen. The Raymond is a spacious house, elegantly furnished and fitted with the most approved modern conveniences, and possesses a splendid staff of servants. It is a place where any one will feel at home. Here I met Mr. Charles H. Hovey—son of the late Mr. Charles M. Hovey, of Cambridge—who is the Superintendent of the extensive grounds and greenhouses. He was pleased to see a Boston face in his far away home, and took pleasure in showing me over the grounds, which are beautifully laid out with forest trees and ornamental shrubs, and also groves of Navel orange trees, many of which are fine specimens. In the grounds I saw many varieties of carnation pinks, larger and of a better color than any I had ever seen before. These were all of his own raising. Here, too, were many hundreds of American Beauty roses in perfection. One greenhouse was filled with cinerarias, which reflected great credit upon the skill of Mr. James Barratt, the gardener, who was formerly with the late Mr. Charles M. Hovey. There were also

some fine cypripediums and other orchids. The whole place was in excellent condition and did credit to the management. Mr. Raymond has expended a large amount of money on this hotel and everything about it is of the very best. Here I saw some wonderful specimens of palms growing out-doors. Mr. Hovey, on the second day of my stay, invited me to accompany him in a drive to Los Angeles, which proved to be a treat. This is comparatively a new city, only fifty years old, and yet there are many beautiful trees and palms there—Araucarias from thirty to forty feet high, and palms from twenty to thirty feet high—with a great variety of other trees and shrubs, which all seem to thrive. Altogether I was delighted with my visit to this pretty place.

I arrived at Chicago, December 20th, and at once proceeded to Boston, which I reached in a miserable snow-storm. After so recently leaving a tropical climate, where the average temperature during my stay was sixty-five degrees, the change was great, I assure you.

Japan is a paradise for travellers. There everyone has an opportunity to practice the lost art of politeness, for civility is a common virtue, even among the lower classes. I mastered sufficient of the language in five days to get along pretty well, and make myself understood; although the peculiarity of the rather discordant dialect is such that you can learn it one day and forget it the next more easily than anything else I know of. The guide books are excellent, and the jinrikisha men are most faithful and intelligent attendants. A rikisha is a two-wheeled conveyance, after the style of an old English gig, and is drawn in a comfortable and rapid manner by a native, who is at once driver and motive power, your guide, your servant, your loyal adviser and friend. Europeans too often go to Japan with an idea that the native is something inferior to themselves, and so they treat them much as they might a dog; but the Jap is quick to detect this, and he will resent it. On the other hand if you treat them with due respect they discover that as quickly, and then they will do anything in their power to please. They are wonderfully keen in their discrimination of human character, and will not make friends if not satisfied on a first introduction.

The Japanese men dote on women. The latter are exceedingly submissive, attentive to your wants, and pleasing in manner; they are shy, demure little dolls, and seem to be always happy.

They make excellent housewives. On several occasions I was invited to take tea with Europeans who have taken unto themselves Japanese wives. In each of these cases I found the children well educated in English and music, and the mothers very accomplished. One Scotch gentleman who had married a Japanese woman had a pretty little family, two girls and a boy, and I was surprised to find how well they were educated.

The home in Japan is very sacred, no stranger or foreigner is allowed to enter there. You may go to their residence and visit certain rooms, but you will never be allowed to put your foot into the inner sanctuary. There are in Yokohama alone some six thousand Europeans, and many of these are married to natives, although it is but little over thirty years since foreigners were first allowed to settle there. The guides are particularly interesting in their way, but like the guides of European countries they have learned their lesson and repeat it parrot fashion, and like those of other countries often point out what they call wonderful things, but which are anything but such. When I was at Nikho the guide said he would show me a tree I had never seen before. This turned out to be a camellia, about twenty feet in height, which was completely covered by mistletoe. Truly it did look peculiar, but when I told the man what it was he seemed to be dreadfully put about.

The theatres of Tokio are grand, and I was surprised by the size and beauty of the Imperial Opera House, which I visited, and was equally pleased with the music and dancing. The Imperial box, in which we sat, faces the stage in the middle of the house, and below it is a range of smaller boxes in each of which is seen the everlasting little stove for making tea. I was greatly amused when there to see a Japanese just below me in one of the smaller boxes — he was a large man for a native, but nothing like my weight — standing up and beckoning me to go to his box. He drew the attention of the whole house to our box by his antics and his calling out to me, "You big, you big." Of course I did not go down to him, but directly after two pretty little girls, who were with the big Jap, came up to our box and sat down one on each side of me and remained there through the performance, laughing and joking, and seemed greatly to admire my corpulence.

The Japanese gardens are the most fairy-like places. You see there growing tiny trees and flowering plants, diversified with

ponds, bridges, paths, summer houses, lanterns, and all things necessary to make the scene beautiful. Here are dwarf pines, six or eight inches high, known to have existed one hundred and twenty-five years, and others a foot high and five hundred years old. In the garden of Yeiju-in, standing within the temple grounds, there are many pæony plants, mostly old, but one which is one hundred years of age. It is about eight feet high and is quite a tree.

Most of the soil of Japan is a rich peaty loam, but this is interspersed with a yellow, light clayey soil. Both these are extremely fertile, and in each there seems to be planted that which is peculiar to the ground. The fertilizer most commonly used is rice straw cut into small pieces as though it had been through a hay cutter; but the people depend almost entirely upon the irrigation from the rivers, the soil being most prolific. Yet it is most carefully cultivated. A weed or a waste piece of land will not be seen in a long railway journey. The farmer seems to utilize every bit of land in his possession. The farming instruments, however, are very crude. A spade is never seen, and the only implement is the big bog hoe, with a blade about four inches wide. The ground is light, and after turning it over with the hoe it is left for two or three days, exposed to the sun. Then it is levelled down and the seed sown. Everything but rice is carefully planted in straight rows. Occasionally one may see a black bull hitched to an ancient looking instrument, which is dignified by the name of plough, but it is so small that it looks more like a toy than anything else. Women and men are engaged in the fields, and while I was there they were harvesting rice. The manner in which they threshed the rice was singular. Women and young children draw the straw across what seems to be a saw on a saw horse and the teeth caught the rice and separated it.

It is a matter of some wonder to our own gardeners how the Japanese curtail the growth of their plants as they do, while we find pleasure in increasing their size. There is as much art in keeping down the growth, and having dwarf plants, as in extending the growth. After consideration and noticing the plants in Japan, my opinion is that the glazed or marble pots they use, and which are not porous, retain moisture longer without watering, and it is not necessary to repot so often. I mean to test this by experience. If you ask a Japanese how he does this, he

immediately avoids the question and turns to something else. How they do manage to keep down the plants to this small size is a matter of conjecture only. But I noticed that all over Japan they use very finely sifted soil for potting, and make it very firm and tight round the roots. They seem to understand the true art of watering, and this, it appears to me, is the main secret of their success.

Nature and art go hand in hand in Japan. The people never try to appear to be other than they are, and never force things. By this I mean there is none of that eternal rush we have here. The native takes things easy and never hurries. They are a clever and industrious people. They are perhaps the cleanest in the world, and take their bath two or three times a day, with the water almost at boiling heat, and this is practised as much in the country as in the cities. The bath tub is everywhere. During my visit I went through several silk and vase factories and was surprised to see the beautiful specimens of work done, even by children of only five to ten years old. They were making vases and other porcelain ware which would take as long as eleven months for the completion of a single piece, because of the amount of labor, and the time necessary to dry the work at each stage. They are equally clever in needle-work.

If tourists wish to renew their life, I should say by all means go to Japan instead of Europe; there they may have enjoyment and rest. Besides, the beauty of the country has no end. Long as I have cultivated the chrysanthemum I had never seen a flower until I went to Japan, where everyone loves it. I visited five hundred places where the flower is cultivated, and these were only the principal gardens in a few of the large cities.

I do not desire that anyone should think by my reading this paper that I want to say I have seen Japan. I have only seen what is comparatively a very small portion of that wonderful country. Some people speak of going to Japan and having seen it, but too often they have only had a glimpse of it. You do not see Japan by looking through its temples, or riding over its mountains, grand as they are. You need to go among the people — among all classes, and into the backyards as well as the front-yards to find what there is to know. In the most unlikely places you will find the most curious novelties. It is the same in the country, among the rice fields, and there you will meet what may

be termed the lowest stratum of society. But go where you will you will find politeness and a refined manner, even among the humblest. It seems to be born in them; especially is this the case with the women, who always answer you with a smile and a bow.

If I have afforded my hearers any pleasure, I can only say I feel repaid for any trouble I have been at in preparing this paper. On the table will be seen photographs of some of the places I visited in Japan, which are open to your inspection. From time to time I hope to be able to show in this room some of the results of my trip to Japan.

A number of photographs of Japanese persons, travellers, the rikisha, views, colored drawings of plant leaves; a large screen of intricate design in needle-work, done by children of ten to twelve years of age; a living plant of Sago Palm, one hundred and twenty-five years old, in a pot — about seven inch — in which it has been kept during the last fifty years; also a very pretty and engaging little Japanese dog, were exhibited by Mr. Comley, as illustrations of points in his paper.

O. B. Hadwen, the Chairman of the Committee on Discussion, announced that this was the last lecture of this course. On his motion, a vote of thanks to Mr. Comley, for his graphic and very interesting lecture, was unanimously passed.

Experiment Station Reports Wanted.

The Massachusetts Horticultural Society is endeavoring to collect complete sets of the Bulletins and other publications of all the Agricultural Experiment Stations in the United States and Canada. Those named below are wanting, and any person having a spare copy will confer a favor by addressing the Librarian of the Society, Horticultural Hall, Boston.

A considerable number of duplicates are on hand, which will be exchanged for any of those in which the Society is deficient.

Alabama (Ag. and Mech. College Station). — Bulletins 1, (1883), 2–6, (1884), 7–10 and 1–4, (1885), 5–9, (1886), 2, 3, 5, and 6, (1887), and 1, (Jan. 1888). Third Annual Report.

Arizona. — First Annual Report.

Arkansas. — Bulletins 1 and 4.

California. — Bulletins 1, 2, 3, 5, 50, 66.

Colorado. — Bulletin 3.

Connecticut (New Haven Station).—Bulletins 1 to 67, inclusive. Annual Reports for 1877 to 1883, inclusive.

Indiana (Purdue Univ. School of Ag.). — Bulletin 1. College Reports 1 to 14, inclusive.

Kentucky. — Bulletin 10.

Maryland. — Special Bulletin G.

Massachusetts (Hatch Station).— Meteorological Bulletin 5.

Minnesota.—All Reports previous to the Biennial Report for 1885 and 1886.

Missouri.— Bulletins 9, 13, 15, 16, 17, 19, 20, 22, 25, 26, 28, 29, and 33 of Old Series. All annual Reports since the first, for 1888.

New Jersey.— Bulletins 1, 4, 5, 15, 27, and 28.

North Carolina.— Bulletins 1 to 56, inclusive, 62¼, and 69, 2d ed. Meteorological Division, Bulletin 2 (68*b*), and 2d and 3d Annual Reports, for 1888 and 1889. Special Bulletins 1 (77*a*) and 4 (82*a*).

Nebraska.— Bulletins 22 and 23.

North Dakota.— Bulletin 3.

Ohio.— All Bulletins of First Series.

South Carolina.— All Bulletins of Old Series. Third Annual Report.

Tennessee.— All Bulletins of Old Series (beginning in 1882 and ending in 1887).

Texas.— All Bulletins of Old Series.

Vermont.— Bulletin 3.

Ottawa, Ont., Central Experimental Farm.—Dairy Bulletin 2.

Toronto, Ont., Bureau of Industries. — Bulletins 1 to 21, inclusive.

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OF THE

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FOR THE YEAR 1893.

PART II.

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☞ SEE LAST PAGE OF COVER.

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The Secretary read a letter addressed to the President by Samuel Henshaw, Secretary of the Boston Society of Natural History, inviting the members to attend a lecture before the Society of Natural History, by Professor George L. Goodale, on Wednesday evening. The thanks of the Society were voted for this kind and courteous invitation, and it was also voted that the card accompanying it be posted in the Library Room.

O. B. Hadwen, Chairman of the Committee on Publication and Discussion, stated that the Committee would be obliged to those having in mind subjects which they deemed proper for consideration at the next season's meetings for discussion, if they would leave a memorandum of such subjects with the Secretary of the Society.

Adjourned to Saturday, May 6.

BUSINESS MEETING.

SATURDAY, May 6, 1893.

An adjourned meeting of the Society was holden at eleven o'clock, the President, NATHANIEL T. KIDDER, in the chair.

Hon. George M. Brooks, of Concord, was proposed by Charles E. Richardson as a Life Member of the Society.

O. B. Hadwen, Chairman of the Committee on the Columbian Exposition, read a report of the doings of the Committee, and asked that the Committee be discharged, and that the Treasurer of the Society be directed to pay such bills for necessary expenses incurred, as should be audited and approved by the Committee. It was voted that the report be accepted and the Committee discharged, and that the Treasurer pay such bills for necessary expenses as should be approved by the Committee.

George E. Davenport, Chairman of the Committee appointed at the last meeting to prepare a memorial of the late Ebenezer H. Hitchings, read the following:

Preamble and Resolutions of the Massachusetts Horticultural Society on the death of Ebenezer Herring Hitchings.

On Tuesday, March 28, 1893, and on his eighty-fifth birthday, there passed from this life, a member of the Massachusetts Horticultural Society, who for many years has been a conspicuous figure in the rooms of the Society, and whose instructive exhibitions of native plants have not only made his name widely known and dear to all lovers of Nature's floral beauties, but whose earnest enthusiasm, communicating itself to others, made for him a host of friends who will cherish his memory so long as they live.

Such was the freshness and buoyancy of his spirits, and the strength of his love for Nature's charms, which seemed to increase with increasing years, that some of us, although not unmindful of the inevitable certainty of the summons which, sooner or later, comes to us all, had come almost to believe that somewhere, during his intercourse with Nature, he had indeed discovered the fountain of perpetual youth, whose magical waters had given to him exemption from the common lot of man.

But we are awakened from this dream to the reality of that which we call Death, and today we are here to pay our tribute to our friend, whose taking away came to us with all the suddenness of the shock which comes to one from the unexpected death of some dear one suddenly, in all the strength of youth.

But he has left to us a precious legacy, in the lesson of his life, and those of us who, like him, love the wild flowers and Nature, may point with pride to the loveliness of his declining years and exclaim: Behold the influence upon the human soul of that which beautifies old age and makes life worth the living even to the end!

To the Massachusetts Horticultural Society the loss of such a man as he whose death we now deplore, with his immeasurable influence for good in the educational direction of its work, is so great — leaving as it does, a void which it will be difficult to fill — that we can only feebly express our deep sense of it in any resolutions we may frame and place upon record.

Desiring, however, to show in some manner our appreciation of the life work of our departed brother member, and to pay that tribute of respect due to his memory, we do hereby

Resolve, That it is with feelings of the profoundest sorrow that the Massachusetts Horticultural Society records the death of Ebenezer Herring Hitchings, an old and valued member of the Society, whose unflagging interest in its welfare characterized his

long and useful membership, and whose constant and earnest endeavors to create an interest in, and love for our native plants, and to disseminate throughout the community a knowledge of the rare and choice things to be found in Nature, through the medium of frequent exhibitions of the best in their seasons, from year to year, gave to the service of his membership an unusual importance and value, thereby making his loss all the greater. Therefore, be it also

Resolved, That this Society, while thus recording its sorrow for the death of Mr. Hitchings, furthermore desires to place upon record its appreciation of the character of the MAN, the value of his membership and its sincere respect for his memory.

Resolved furthermore, That a copy of the Preamble and these Resolutions be sent to the family of the deceased, as an expression of the sympathy of this Society with them in their bereavement.

GEORGE E. DAVENPORT,
EDWIN FAXON,
JOSEPHINE L. RICHARDS, } *Committee.*

The adoption of the Resolutions was seconded by John C. Hovey, who spoke of Mr. Hitchings as the first botanist placed on the Flower Committee, and one of the first to exhibit native plants, persevering in the work until their exhibition had reached its present extent. Mr. Hovey concluded by expressing the hope that in the future there may rise up those who will make his place good.

On putting the question on the adoption of the Resolutions the President called for a rising vote, and they were unanimously thus adopted.

WILLIAM B. S. DOWSE of West Newton,

having been recommended by the Executive Committee as an Annual Member, was on ballot duly elected.

Adjourned to Saturday, June 3.

BUSINESS MEETING.

SATURDAY, June 3, 1893.

An adjourned meeting of the Society was holden today at eleven o'clock, the President, NATHANIEL T. KIDDER, in the chair.

In the absence of the Secretary, the President appointed Miss Charlotte M. Endicott Secretary *pro tem*.

The following named persons, having been recommended by the Executive Committee as Members of the Society, were on ballot duly elected:

THOMAS H. LORD, of Boston.
Hon. GEORGE M. BROOKS, of Concord.
CHARLES N. CARTER, of Boston.
Mrs. NANCY J. BIGELOW, of Southborough.
THOMAS E. PIGOTT, of Winthrop.
WILLIAM C. G. SALISBURY, of Brookline.
W. CLIFFORD FRENCH, of Boston.

The meeting was then dissolved.

BUSINESS MEETING.

SATURDAY, July 1, 1893.

A duly notified Stated Meeting of the Society was holden at eleven o'clock, the President, NATHANIEL T. KIDDER, in the chair.

The President, as Chairman of the Executive Committee, reported from that Committee a recommendation that the Society make an additional appropriation of one hundred dollars for the use of the Library Committee, for the purchase of magazines and newspapers, binding of books, and incidental expenses of the Committee. The report was accepted and the appropriation was unanimously voted.

The Secretary read circulars from Col. Albert A. Pope, concerning the improvement of roads. After discussion it was voted that the President of the Society be authorized to petition the Senate Committee of Congress, setting forth the importance of good roads in relation to agriculture, and asking the Committee to consider the expediency of legislation by Congress for the improvement of roads.

The Secretary announced the receipt of a letter from Hon. J. Sterling Morton, of Washington, D. C., Secretary of Agriculture,

acknowledging and accepting the Honorary Membership in this Society to which he had been elected; also letters from B. E. Fernow of Washington, D. C., Chief of the Division of Forestry, United States Department of Agriculture, and William Trelease, of St. Louis, Mo., Director of the Missouri Botanic Garden, acknowledging and accepting the Corresponding Memberships in this Society, to which they had been elected; and a letter from Dr. George King, Superintendent of the Royal Botanic Garden, Calcutta, acknowledging the receipt of his Diploma as a Corresponding Member of this Society.

The following named persons, having been recommended by the Executive Committee for membership in the Society, were on ballot duly elected:

JABEZ A. SAWYER, of Cambridge.
WILLIAM C. BARRY, of Rochester, N. Y.
Col. RICHARD F. BARRETT, of Concord.

Adjourned to Saturday, August 5.

BUSINESS MEETING.

SATURDAY, August 5, 1893.

An adjourned meeting of the Society was holden at eleven o'clock, the President, NATHANIEL T. KIDDER, in the chair.

Agreeably to the Constitution and By-Laws, the President appointed the following named members a Committee to nominate candidates for officers and standing committees of the Society for the next year:

William H. Spooner, *Chairman*.

J. D. W. French,	E. W. Wood,
John G. Barker,	Arthur H. Fewkes,
Samuel Hartwell,	Benjamin M. Watson, Jr.

The Secretary read an invitation to the Society, from the Australian Association for the Advancement of Science, to attend their meeting at Adelaide, South Australia, commencing September 25. 1893. The thanks of the Society were voted for the invitation.

Miss SARAH PARKER, of Roxbury,
having been recommended by the Executive Committee as a member of the Society, was upon ballot duly elected.

Adjourned to Saturday, September 2.

BUSINESS MEETING.

SATURDAY, September 2, 1893.

An adjourned meeting of the Society was holden at eleven o'clock, the President, NATHANIEL T. KIDDER, in the chair.

William H. Spooner, Chairman of the Committee appointed at the last meeting to nominate candidates for officers and standing committees of the Society for the year 1894, reported a printed list, which was accepted. It was voted that the Committee be continued, and requested to nominate candidates in place of any who might decline before the election.

JOHN C. PAIGE, of Boston,
having been recommended by the Executive Committee as a member of the Society, was on ballot duly elected.

The meeting was then dissolved.

BUSINESS MEETING.

SATURDAY, October 7, 1893.

A Stated Meeting of the Massachusetts Horticultural Society, being the Annual Meeting for the choice of Officers and Standing Committees, was holden today at eleven o'clock, the President, NATHANIEL T. KIDDER, in the chair.

The Secretary stated that the meeting had been duly notified to the members of the Society agreeably to the Constitution and By-Laws.

On motion of William H. Spooner, it was voted that the polls be opened and kept open two hours.

Mr. Spooner as Chairman of the Nominating Committee made the additional report that the Committee had nominated Augustus Parker as Vice-President, and Augustus Hemenway as member of the Finance Committee,— both in place of Frederick L. Ames, deceased. The report was accepted.

Agreeably to the Constitution and By-Laws, the President appointed William H. Hunt, O. B. Hadwen, and Samuel Hartwell a Committee to receive, assort, and count the votes given, and report the number. The polls were opened at a quarter past eleven o'clock.

While the voting was in progress a letter from James Boyden was read by William C. Strong, offering, in behalf of Miss Simpkins, of Yarmouthport, a Silver Cup, of the value of forty dollars, to be awarded as a prize for the best twelve blooms of any pink Chrysanthemum, other than Pompon, the stems to be not less than two feet long, and the exhibit to be made in one vase at the Chrysanthemum Show, November 7–10. It was voted that the thanks of the Society be presented to Miss Simpkins for this liberal prize, and that the Secretary prepare a circular announcing it, to be sent to chrysanthemum growers.

The President made the official announcement of the death of Frederick L. Ames, whom he spoke of as a valuable friend of the Society, and as one known the world over as a lover of horticulture. On motion of Mr. Spooner it was voted that Professor Charles S. Sargent, Dr. Henry P. Walcott, and Francis H. Appleton be a Committee to prepare an expression of the feelings of the Society in regard to the death of Mr. Ames.

The following named persons, having been recommended by the Executive Committee as members of the Society, were upon ballot duly elected:

HENRY SARGENT HUNNEWELL, of Wellesley.
PHILIP CODMAN, of Brookline.
JOHN GEORGE JACK, of Jamaica Plain.
ALBERT A. H. MEREDITH, of Milton.
ARCHIBALD SMITH, of Somerville.

The following named persons were proposed as members:

Ellerton P. Whitney, of Milton, by Nathaniel T. Kidder, as a Life Member.

Charles Eliot, of Milton, proposed by Nathaniel T. Kidder, as a Life Member.

William Christie, of Newton, proposed by Charles N. Brackett, as a Life Member.

The polls were closed at a quarter past one o'clock, and the Committee to receive, assort, and count the votes, and report the number given, reported the whole number to be forty-six, and that the persons named on the ticket reported by the Nominating Committee had a plurality of the votes cast.

The report of the Committee was accepted, and the persons reported as having a plurality of votes were, agreeably to the Constitution and By-Laws, declared by the President to be elected Officers and Standing Committees of the Society for the year 1894.

Adjourned to Saturday, November 1.

BUSINESS MEETING.

SATURDAY, November 4, 1893.

An adjourned meeting of the Society was holden at eleven o'clock, the President, NATHANIEL T. KIDDER, in the chair.

The following named persons were proposed as members of the Society:

Desmond Fitz Gerald, of Brookline, proposed by Nathaniel T. Kidder.

Francis H. Peabody, of Boston, proposed by Nathaniel T. Kidder, as a Life Member.

F. Tracey Hubbard, of Cambridge, proposed by Edward L. Beard, as an Annual Member.

Francis Blake, of Weston, proposed by Benjamin M. Watson, Jr., as a Life Member.

Francis H. Appleton, from the Committee appointed at the last meeting to prepare an expression of the feelings of the Society in regard to the death of Frederick L. Ames, presented the following:

FREDERICK LOTHROP AMES,
Died September 13, 1893.

Your Committee to whom was assigned the duty of preparing a Memorial of the late Hon. Frederick Lothrop Ames, to be placed upon our records, respectfully submit the following tribute:

In 1865 Mr. Ames became a Life Member of our Society, and he has taken a prominent part in promoting the objects for which the Society was founded, in collecting, raising, and importing, in great variety; in contributing largely to our exhibitions, and in giving of his knowledge and good judgment, while an important officer since 1879.

It was largely, but by no means exclusively, through his wide knowledge of orchids, and his wonderful collection of them — probably the finest — that he was known throughout the horticultural world. His ambition and success in establishing that noted collection, surrounded in his glass houses by much of rare horticultural beauty and in great variety, has resulted in having the fame for this work credited not alone to Mr. Ames and his own State, but also to our Nation. Honor to the man whose work brings honor to his country!

Let us recall that this Society has been built up from small beginnings, and has reached its present standing by the energy, loyalty, and zeal of its members, guided by a wise and careful regard for a safe and high standard as to its financial policy, until it has become a movement of usefulness and a source of great pride, not only to all its members, but to persons of every degree of horticultural taste, whether directed in the lines of business or recreation.

It is largely due to Mr. Ames' guardianship of the careful financial policy, which this Society has constantly maintained from the beginning, that its usefulness in protecting and promoting all horticultural interests is so great. He regarded the welfare of this Society from a high and sound standpoint, knowing well that constant improvement is the only principle under which that standard can be maintained.

Mr. Ames was a member of the Executive Committee from 1879 until and including 1892, and a member of the Finance Committee from 1882 until the time of his death. He was a faithful and diligent servant of the Society upon this latter Committee, having its greatest usefulness always at heart. He was a Vice President from 1886 until 1891, and also in 1893.

His love of rural life in all its varied forms, and his interest in its development, made him a valued member. His generosity

in the promotion of botanical research at Harvard University should be appreciated by all horticulturists. The knowledge that he possessed of the details of horticultural management would be recognized as remarkable, especially when his extensive business responsibilities are borne in mind.

His loss to our Society is great, and in recognition of his faithful and useful services as an officer and member, we recommend that these expressions be placed upon our records, and that a copy be sent to the family of our late associate.

CHARLES S. SARGENT,
HENRY P. WALCOTT,
FRANCIS H. APPLETON,
} *Committee.*

The report was unanimously accepted and adopted.

The President, as Chairman of the Executive Committee read the following report:

At the regular meeting of the Executive Committee held Oct. 26, 1893, it was unanimously voted to recommend to the Society to make the following appropriations for prizes and gratuities for the year 1894:

For Plants,	$2,000
" Flowers,	2,500
" Fruits,	1,800
" Vegetables,	1,100
" Gardens,	500
Total,	$7,900

The report was accepted, and, agreeably to the Constitution and By-Laws, was laid over for final action at the stated meeting on the first Saturday in January, 1894.

William H. Spooner stated that important matters would come before the Finance Committee during the present year, and moved the election of Augustus Hemenway, to fill the vacancy caused by the death of F. L. Ames. Mr. Hemenway was accordingly elected.

The following named persons, having been recommended by the Executive Committee as members of the Society, were upon ballot duly elected:

ELLERTON P. WHITNEY, of Milton.
CHARLES ELIOT, of Milton.
WILLIAM CHRISTIE, of Newton.
WILLIAM ENDICOTT, JR., of Boston.

Adjourned to Saturday, December 2.

BUSINESS MEETING.

SATURDAY, December 2, 1893.

An adjourned meeting of the Society was holden at eleven o'clock, the President, NATHANIEL T. KIDDER, in the chair.

John G. Barker, Chairman of the Committee on Gardens, reported the awards made by that Committee during the present year, and asked further time to prepare the remainder of the report. The report was accepted and further time was granted.

Arthur H. Fewkes, Chairman of the Committee on Flowers, reported the amount awarded by that Committee in Prizes and Gratuities to the present time, and asked further time to prepare the remainder of his report. The report was accepted and further time was granted.

E. W. Wood, Chairman of the Committee on Fruits, read the Annual Report of that Committee, which was accepted and referred to the Committee on Publication.

Joseph H. Woodford, Chairman of the Committee of Arrangements read the Annual Report of that Committee, which was accepted and referred to the Committee on Publication.

William C. Strong moved that a committee of three be appointed by the Chair, to take proper notice of the death of Ex-President Parkman. The motion was carried, and the Chair said that he would announce the committee at the next meeting.

On motion of William H. Spooner it was voted that when the Society adjourn it be for two weeks.

E. W. Wood, Chairman of the Committee on Establishing Prizes, reported the Schedule of Prizes for the year 1894, as

prepared by that Committee. On motion of Mr. Strong it was voted that the Schedule be laid before the Society in print at the next meeting.

The Secretary read a letter from Ernst H. Krelage, of Haarlem, Holland, presenting to the Library, as a souvenir of the visit which he paid to it a short time ago, a rare book (which was laid before the Society) on the Culture of Hyacinths and other bulbs. The thanks of the Society were voted to Mr. Krelage for this donation.

The following named persons, having been recommended by the Executive Committee, were on ballot duly elected members of the Society:

DESMOND FITZ GERALD, of Brookline.
FRANCIS H. PEABODY, of Boston.
F. TRACEY HUBBARD, of Cambridge.
FRANCIS BLAKE, of Weston.
FREDERICK COLE, of Wellesley.
THEOPHILUS D. HATFIELD, of Wellesley.
WARREN J. ROBINSON, of Somerville.
THOMAS J. ROWLAND, of Nahant.

Adjourned to Saturday, December 16.

BUSINESS MEETING.

SATURDAY, December 16, 1893.

An adjourned meeting of the Society was holden at eleven o'clock, the President, NATHANIEL T. KIDDER, in the chair.

The President announced the Committee to prepare a memorial of Ex-President Francis Parkman, as Ex-Presidents Henry P. Walcott, William C. Strong, and William H. Spooner.

Arthur E. Whitney, of Winchester, was proposed by Robert Manning, as a Life Member of the Society.

Nathaniel I. Bowditch, of Framingham, was proposed by J. D. W. French, as a Life Member of the Society.

The Schedule of Prizes for 1894 was, agreeably to the vote passed at the last meeting, laid before the Society in print. After some discussion and amendment it was adopted and referred back to the Committee on Establishing Prizes, to fix the date of the Spring Exhibition, with full powers.

Dr. Walcott, Chairman of the Committee to prepare a memorial of Ex-President Parkman, reported the following:

Francis Parkman died at Jamaica Plain, November 8, 1893.

Literary societies have already fitly commemorated the loss of our greatest historian; our oldest university has publicly rehearsed to a younger generation the lessons of the life of the scholar who, conquering a frail and suffering body, carried to completion the great work which in youth he had selected for the labor of a life-time.

The Massachusetts Horticultural Society here records its loving remembrance of one of its most active and interested associates.

He was for three years the energetic and wise President of this Society. He practised the art of gardening with a success rarely equalled by those even who have devoted their lives to that occupation. He was the first Professor of Horticulture in the University at Cambridge. He introduced to cultivation in this country many new and attractive plants. He produced new varieties in the lily and the poppy, which will long adorn the gardens of the world, and he wrote one of our most useful books on the rose and its culture.

No man gave to the art, to the encouragement of which this Society is dedicated, a more loving or devoted service.

For the Committee,

H. P. Walcott.

December 16, 1893.

After remarks by Mr. Strong, of the Committee, the memorial was unanimously adopted, and it was voted that it be entered on the records of the Society, and that a copy be sent to the family of Mr. Parkman.

Charles N. Brackett, Chairman of the Committee on Vegetables, read the annual report of that Committee.

William E. Endicott, Chairman of the Committee on the Library, read the annual report of that Committee.

Robert Manning read his annual report as Secretary and Librarian.

These three reports were severally accepted and referred to the Committee on Publication.

Francis H. Appleton moved that a committee be appointed, agreeably to the request in the Report of the Library Committee, to obtain an estimate of the cost of extending the gallery in the Library Room, around the Librarian's room. At the suggestion of the President the vote was amended so as to refer the matter to the Executive and Finance Committees, who were already charged with the consideration of the subject of better accommodations for the Exhibitions and Library. As thus amended the vote was unanimously carried in the affirmative.

The Annual Report of the Committee on Flowers was submitted by the Secretary, who read a note from Arthur H. Fewkes, Chairman, stating that he was too ill to attend the meeting. It was voted that the reading of the report be postponed until the next meeting.

The meeting was then dissolved.

REPORT

OF THE

COMMITTEE ON PLANTS,

FOR THE YEAR 1893.

By DAVID ALLAN, CHAIRMAN.

During the year 1893, the sum of $1,686 was awarded in Prizes and Gratuities for Plants, leaving an unexpended balance of $314.

March 4, Jackson Dawson, of the Arnold Arboretum, was awarded a Silver Medal for a new first-class Rose,—a hybrid between Gen. Jacqueminot and the single *Rosa rugosa*.

At the Spring Exhibition, March 21–24, a Silver Medal was awarded to Francis Brown Hayes for *Cycas revoluta*.

June 13, a Silver Medal was awarded to F. Sanders, of St. Albans, England, for *Dracæna Sanderiana*.

July 29, Hon. Joseph S. Fay received the award of a Gold Medal for Superior Cultivation of Hydrangeas.

At the Annual Exhibition of Plants and Flowers, September 6 and 7, Silver Medals were awarded to George McWilliam for display of *Caladium argyrites*; Nathaniel T. Kidder for *Davallia Fijiensis*; Joseph H. White for *Nephrolepis exaltata*; and Pitcher & Manda of Short Hills, N. J., for *Araucaria excelsa compacta*, a grand evergreen sub-tropical shrub.

The Annual Chrysanthemum Show was held on the 7th, 8th, 9th and 10th of November, when several growers staged the finest

plants ever shown at any exhibition in the United States. The varieties were:

A. Fewkes.	Louis Boehmer.
Canning.	Mrs. Bishop.
Grandiflora.	President Hyde.
Ivory.	Puritan.
J. H. White.	W. A. Falconer.
Lincoln.	W. B. Smith.

In the next season we expect even better results, the prizes offered being within the reach of the small as well as the large growers.

For the Committee,

DAVID ALLAN,

Chairman.

PRIZES AND GRATUITIES AWARDED FOR PLANTS.

FEBRUARY 4.

LACHENALIAS.— Three six-inch pots, John L. Gardner . . . $5 00

Gratuities :—

George M. Anderson, Display of Cyclamens 6 00
Mrs. A. D. Wood, Heaths, etc. 3 00
Nathaniel T. Kidder, *Acacia heterophylla* 2 00
George B. Gill, two pots of Narcissuses 1 00
John L. Gardner, Freesias 1 00

FEBRUARY 25.

Gratuity :—

Charles E. Richardson, Seedling Amaryllis 2 00

SPRING EXHIBITION.

MARCH 21, 22, 23, AND 24.

Theodore Lyman Fund.

INDIAN AZALEAS.— Six distinct named varieties, in pots, Nathaniel T. Kidder 20 00
Second, Francis Brown Hayes 15 00
ORCHIDS.— Ten plants in bloom, the second prize to E. W. Gilmore 25 00

Society's Prizes.

INDIAN AZALEAS.— Two distinct named varieties, in not exceeding ten-inch pots, Nathaniel T. Kidder 6 00
Second, Francis Brown Hayes 4 00
Specimen plant, named, Dr. C. G. Weld 8 00
Second, Francis Brown Hayes 6 00
Single plant, of any named variety, in not exceeding an eight-inch pot, Dr. C. G. Weld 5 00
ORCHIDS.— Three plants in bloom, Nathaniel T. Kidder . . . 10 00
Second, Nathaniel T. Kidder 8 00
Single plant in bloom, E. W. Gilmore 5 00
Second, Francis Brown Hayes 4 00
STOVE OR GREENHOUSE PLANT.— Specimen in bloom, other than Azalea or Orchid, named, Dr. C. G. Weld, *Acacia pubescens* 8 00
Second, John L. Gardner, *Boronia heterophylla* . . . 6 00

HARDY FLOWERING DECIDUOUS SHRUBS, FORCED.— Four of four distinct species, named, Bussey Institution	8 00
Second, Bussey Institution	6 00
HARDY FLOWERING EVERGREEN SHRUBS, FORCED.— Four of four distinct species, named, Bussey Institution	8 00
CYCLAMENS.— Ten plants in bloom, Dr. C. G. Weld	8 00
Second, George M. Anderson	6 00
Third, Mrs. Mary T. Goddard	4 00
Three plants in bloom, Dr. C. G. Weld	4 00
Second, George M. Anderson	3 00
Third, Mrs. Mary T. Goddard	2 00
Single specimen in bloom, George M. Anderson	3 00
Second, Dr. C. G. Weld	2 00
Third, Mrs. Mary T. Goddard	1 00
HARD-WOODED GREENHOUSE PLANTS.— Four in bloom, Nathaniel T. Kidder	8 00
Second, Dr. C. G. Weld	6 00
HARDY POLYANTHUSES.— Ten, plants, Fancy and Gold Laced, William Patterson	5 00
Second, Dr. C. G. Weld	4 00
AURICULAS.— Six, in pots, Dr. C. G. Weld	3 00
CINERARIAS.— Six varieties in bloom, in not over nine-inch pots, John L. Gardner	8 00
Second, Elisha S. Converse	6 00
Third, Dr. C. G. Weld	5 00
Three varieties in bloom, in not over nine-inch pots, Dr. C. G. Weld	5 00
Second, John L. Gardner	4 00
Single plant in bloom, John L. Gardner	3 00
Second, Dr. C. G. Weld	2 00

Special Prize for Florists only.

GENERAL DISPLAY OF SPRING BULBS.— All classes, Bussey Institution	12 00
Second, William S. Ewell & Son	10 00

Regular Prizes.

HYACINTHS.— Twelve distinct named varieties, in pots, one in each pot, in bloom, Dr. C. G. Weld	10 00
Second, John L. Gardner	8 00
Third, George M. Anderson	6 00
Six distinct named varieties, in pots, one in each pot, in bloom, Dr. C. G. Weld	6 00
Second, Nathaniel T. Kidder	5 00
Third, George M. Anderson	4 00
Three distinct named varieties, in pots, one in each pot, in bloom, Nathaniel T. Kidder	4 00

Second, Dr. C. G. Weld	3 00
Third, George M. Anderson	2 00
Single named bulb, in pot, in bloom, Dr. C. G. Weld	2 00
Second, Nathaniel T. Kidder	1 00
Three pans, not to exceed twelve inches, ten bulbs of one variety in each pan, in bloom, Dr. C. G. Weld	10 00
Second, Nathaniel T. Kidder	8 00
Third, John L. Gardner	6 00
Two pans, ten bulbs of one variety in each pan, in bloom, Dr. C. G. Weld	8 00
Second, Nathaniel T. Kidder	6 00
Third, John L. Gardner	5 00
Single pan, with ten bulbs of one variety in bloom, Nathaniel T. Kidder	5 00
Second, Dr. C. G. Weld	4 00
Third, John L. Gardner	3 00
TULIPS.— Six eight-inch pans, nine bulbs in each, in bloom, Nathaniel T. Kidder	5 00
Second, William S. Ewell & Son	4 00
Third, Bussey Institution	3 00
Three eight-inch pans, nine bulbs in each, in bloom, Dr. C. G. Weld	4 00
Second, William S. Ewell & Son	3 00
Third, Bussey Institution	2 00
Three ten-inch pans, twelve bulbs of one variety in each pan, William S. Ewell & Son	6 00
Second, Dr. C. G. Weld	5 00
Third, Bussey Institution	4 00
Fourth, Nathaniel T. Kidder	3 00
POLYANTHUS NARCISSUS.— Four seven-inch pots, three bulbs in each, distinct varieties, in bloom, Dr. C. G. Weld	6 00
Second, Bussey Institution	4 00
Third, John L. Gardner	3 00
JONQUILS.— Six six-inch pots, number of bulbs at the discretion of the grower, in bloom, Bussey Institution	3 00
Second, John L. Gardner	2 00
LILIUM HARRISII.— Three pots, not exceeding ten inches, George M. Anderson	8 00
Second, Bussey Institution	6 00
LILY OF THE VALLEY.— Six six-inch pots, in bloom, Bussey Institution	5 00
Second, William S. Ewell & Son	4 00
ANEMONES.— Three pots or pans, Bussey Institution	5 00
FREESIAS.— Six pots or pans, John L. Gardner	5 00
Third, Bussey Institution	3 00
IXIAS.— Six pots, in varieties, Dr. C. G. Weld	4 00
ROMAN HYACINTHS.— Six eight-inch pans, ten bulbs in each pan, Bussey Institution	5 00

Second, Dr. C. G. Weld 4 00
Third, John L. Gardner 3 00

Gratuities :—

Siebrecht & Wadley, New Rochelle, N. Y., Orchids, and other rare plants 5 00
Bussey Institution, *Andromeda speciosa* 5 00
L. H. Parker, *Cypripedium acaule* 1 00
Joseph Tailby, Rose W. A. Richardson 3 00
Martin H. Cummings, Carnation Gov. Russell 3 00
Rea Brothers, Seedling *Primula Sieboldi* 10 00
Mrs. Mary T. Goddard, Display of Plants 10 00
Francis Brown Hayes, " " " 10 00
William Patterson, " " " 8 00
Nathaniel T. Kidder, Collection of Plants 5 00
Dr. C. G. Weld, " " " 5 00
Pitcher & Manda, Short Hills, N. J., New Plants 5 00
John L. Gardner, Collection of Plants 3 00

APRIL 1.

Gratuity :—

Francis Brown Hayes, Azalea Mlle. Marie Van Houtte . . . 1 00

APRIL 8.

Gratuities :—

Jackson Dawson, Forced *Spiræa aruncus* 4 00
Whittet & Co., Seedling Cactus 1 00

MAY EXHIBITION.

MAY 6.

PELARGONIUMS.— Six named Show or Fancy varieties, in pots, in bloom, Nathaniel T. Kidder 8 00
Second, John L. Gardner 6 00
INDIAN AZALEAS.— Single specimen, in pot, named, Nathaniel T. Kidder 5 00
CALCEOLARIAS.— Six varieties, in pots, John L. Gardner . . 8 00
Second, Joseph H. White 6 00
Single plant, John L. Gardner 3 00
Second, Joseph H. White 2 00

Gratuities :—

Norton Brothers, Two plants of *Dendrobium thyrsiflorum* . . 3 00
Francis Brown Hayes, Collection of Hydrangeas 5 00
Nathaniel T. Kidder, " " Streptocarpus 4 00
Bussey Institution, " " Ixias 4 00

MAY 13.

Gratuities :—

Robert Petremant, Forty-six pots of Auriculas 3 00
Lewis H. Farlow, *Cattleya Mendelii*, in bloom 1 00
Mrs. S. H. Coleman, Seedling Gloxinia 1 00

ROSE EXHIBITION.

JUNE 22 AND 23.

STOVE AND GREENHOUSE FLOWERING PLANTS — Two distinct named varieties, in bloom, no Orchid admissible, Nathaniel T. Kidder 15 00
Second, Dr. C. G. Weld 10 00
SPECIMEN PLANT IN BLOOM.— Named, other than Orchid, Dr. C. G. Weld 7 00
Second, John L. Gardner 5 00
SPECIMEN FOLIAGE PLANT.— New and rare, other than Orchid, Dr. C. G. Weld 7 00
Second, Nathaniel T. Kidder 5 00
HARD WOODED GREENHOUSE PLANTS.— Three, of three distinct named varieties, in bloom, John L. Gardner . . . 8 00
GLOXINIAS.— Six pots, not less than eight-inch, Dr. C. G. Weld . 8 00
Second, Charles Francis Adams 6 00
ORCHIDS.— Six plants, of six named varieties, in bloom, E. W. Gilmore 25 00
Second, John L. Gardner 15 00
Three plants, of three named varieties, in bloom, Dr. C. G. Weld 15 00
Second, John L. Gardner 10 00
Single specimen plant, named, E. W. Gilmore 8 00
Second, John L. Gardner 6 00
TUBEROUS BEGONIAS.— Six pots, of six varieties, Elisha S. Converse 6 00

Gratuities :—

E. W. Gilmore, Orchids 3 00
John L. Gardner, Orchids and Ericas 3 00
Anthony McLaren, *Phormium tenax variegata* 1 00

JULY 22.

Gratuities :—

John L. Gardner, *Platyclinis filiformis* 5 00
Mrs. A. D. Wood, *Lilium Wallichianum* 2 00
Miss Philena Baker, Cactus bearing thirty flowers 1 00

JULY 29.

HYDRANGEAS.— Pair, Hon. Joseph S. Fay 8 00

AUGUST 12.

Gratuity :—

George M. Anderson, *Heliconia aurea striata* 2 00

AUGUST 26.

Gratuities :—

Charles Storer, *Cattleya Gaskelliana* 1 00
James Comley, *Begonia Rex* var. Duchesse de Brabant . . . 1 00

ANNUAL EXHIBITION OF PLANTS AND FLOWERS.

SEPTEMBER 6 AND 7.

Special Prizes, offered by the Society.

PALMS.— Pair, in pots or tubs not more than twenty-four inches in diameter, George A. Nickerson 12 00
Second, Joseph H. White 8 00
Pair, in pots not more than fourteen inches in diameter, Dr. C. G. Weld 8 00

Regular Prizes.

GREENHOUSE PLANTS.— Six greenhouse and stove plants, of different named varieties, two Crotons admissible, George A. Nickerson 30 00
Second, Nathaniel T. Kidder 25 00
Third, Dr. C. G. Weld 20 00
Single plant for table decoration, dressed at the base with living plants only, only one entry admissible, George A. Nickerson 8 00
Second, Elisha S. Converse 6 00
Third, Joseph H. White 4 00
SPECIMEN FLOWERING PLANT.— Single named variety, Joseph H. White 8 00
Second, Joseph H. White 6 00
FUCHSIAS.— Six, in not over ten-inch pots, Joseph H. White . . 6 00
ORNAMENTAL LEAVED PLANTS.— Six named varieties not offered in the collection of greenhouse plants, Crotons and Dracænas not admissible, Nathaniel T. Kidder 20 00
Second, Joseph H. White 15 00
Third, George A. Nickerson 12 00
Single specimen, variegated, named, not offered in any collection, George A. Nickerson 6 00
Second, Nathaniel T. Kidder 5 00
Third, Joseph H. White 4 00
CALADIUMS.— Six named varieties, Nathaniel T. Kidder . . . 6 00
Second, Dr. C. G. Weld 4 00
FERNS.— Six named varieties, no Adiantums admissible, Nathaniel T. Kidder 10 00

Second, George A. Nickerson 8 00

ADIANTUMS.— Five distinct named species, George A. Nickerson . 8 00

Second, Nathaniel T. Kidder 5 00

TREE FERN.— Single specimen, named, not less than six feet in height, George A. Nickerson 10 00

LYCOPODS.— Four named varieties, Nathaniel T. Kidder . . 5 00

Second, George A. Nickerson 4 00

DRACÆNAS.— Six named varieties, Nathaniel T. Kidder . . 8 00

Second, Dr. C. G. Weld 6 00

CROTONS.— Six named varieties, in not less than twelve-inch pots, George A. Nickerson 10 00

Six in six-inch pots, Dr. C. G. Weld 6 00

CYCAD.— Single plant, named, Mrs. A. D. Wood 10 00

Second, Joseph H. White 8 00

Third, Nathaniel T. Kidder 6 00

ORCHIDS.— Single plant in bloom, the second prize to David Allan . 4 00

Gratuities :—

Dr. C. G. Weld, Display of Plants 15 00

Pitcher & Manda, Short Hills, N. J., Display of Plants . . 10 00

Francis Brown Hayes, " " " . . 5 00

Mrs. A. D. Wood, Collection of varieties of *Begonia Rex* . . 10 00

Mrs. George L. Brown, *Vallota purpurea* 5 00

Joseph H. White, Caladiums 3 00

Joseph Clark, *Campanula pyramidalis alba* 3 00

R. McLellan, *Lomaria gibba var.* 3 00

OCTOBER 7.

Gratuity :—

Hon. Joseph R. Leeson, *Cattleya Bowringiana* 2 00

CHRYSANTHEMUM SHOW.

NOVEMBER 7, 8, 9, AND 10.

CHRYSANTHEMUMS.— Display of twelve named plants, any or all classes, distinct varieties, Walter Hunnewell 60 00

Second, Nathaniel T. Kidder 50 00

Third, Arthur Hunnewell 40 00

Fourth, Dr. C. G. Weld 30 00

Group of Plants, arranged for effect, limited to one hundred and fifty square feet, William H. Elliott 45 00

Second, Bussey Institution 40 00

Third, Francis Brown Hayes 35 00

Six Japanese, distinct named varieties, Dr. C. G. Weld . . 20 00

Second, Walter Hunnewell 15 00

Third, Nathaniel T. Kidder 10 00

Specimen Incurved or Chinese, named variety, Dr. C. G. Weld	6 00
Second, Arthur Hunnewell	5 00
Third, Nathaniel T. Kidder	4 00
Specimen Japanese, named variety, Walter Hunnewell	6 00
Second, Arthur Hunnewell	5 00
Third, Nathaniel T. Kidder	4 00
Specimen Pompon, named variety, Arthur Hunnewell	5 00
Second, Arthur Hunnewell	4 00
Third, Dr. Henry P. Walcott	3 00

Gratuities:—

William H. Elliott, Display of Chrysanthemums	25 00
David Allan, " " Orchids	3 00
Joseph Tailby, Callas,	2 00

NOVEMBER 18.

Gratuity:—

Francis Brown Hayes, Display of New Chrysanthemums	15 00

DECEMBER 30.

Gratuity:—

John L. Gardner, Orchids, Heaths, and Poinsettias	10 00

SOCIETY'S GOLD MEDAL.

July 29. Hon. Joseph S. Fay (M. H. Walsh, Gardener), Superior Cultivation of Hydrangeas.

SOCIETY'S SILVER MEDALS.

March 4. Jackson Dawson, Hybrid Seedling Rose, Arnold; a cross between *Rosa rugosa* and Gen. Jacqueminot, serviceable as a hardy decorative shrub.

Spring Exhibition, March 21–24. Francis Brown Hayes, *Cycas revoluta.*

June 13. F. Sander & Co., St. Albans, Herts, England, *Dracæna Sanderiana.*

Annual Exhibition, September 6 and 7. George McWilliam, Display of *Caladium argyrites.*

" " " " Nathaniel T. Kidder, *Davallia Fijiensis.*

" " " " Joseph H. White, *Nephrolepis exaltata.*

" " " " Pitcher & Manda, Short Hills, N. J., *Araucaria excelsa compacta.*

SOCIETY'S BRONZE MEDALS.

Annual Exhibition, September 6 and 7. Pitcher & Manda, *Geonoma acaulis.*

September 23. Hon. Joseph R. Leeson, *Saccolabium guttatum.*

FIRST-CLASS CERTIFICATES OF MERIT.

Spring Exhibition, March 21–24. Pitcher & Manda, Short Hills, N. J., *Cypripedium Grayanum unicolor.*

Rose Show, June 23. William W. Lunt, *Cattleya gigas.*

" " " Jackson Dawson, New Hybrid Seedling Rose, a cross between *Rosa Wichuriana* and Gen. Jacqueminot.

July 15. Hon. Joseph R. Leeson, *Cattleya Leopoldii.*

Annual Exhibition, September 6 and 7. Pitcher & Manda, Short Hills, N. J., *Cypripedium Allanianum.*

" " " " Pitcher & Manda, *Cypripedium luridum.*

" " " " Pitcher & Manda, Display of Rare Plants.

" " " " Dr. C. G. Weld, *Pteris tremula Smithiana.*

" " " " Nathaniel T. Kidder, *Allamanda Williamsii.*

Chrysanthemum Show, November 7–10. Rea Brothers, *Aster grandiflorus.*

REPORT

OF THE

COMMITTEE ON FLOWERS,

FOR THE YEAR 1893.

By ARTHUR H. FEWKES, CHAIRMAN.

The report of the Committee on Flowers, for the year 1893, is a short one, as there has been but little out of the ordinary course in the way of exhibitions. In general there has been not less than the usual interest manifested either by the exhibitors or by those who visit our exhibitions and we have had excellent displays of all the favorite and time-honored flowers.

The displays of Herbaceous Plants, while not lacking in interest, have not been so numerous as last year and the competition has been less spirited.

We have noted an increase in the number of mixed displays, which we deplore, for, while they serve to embellish the tables, they are not educational, and it has been our endeavor to make the highest awards where the idea of the exhibitor has been to give as much information to the public as possible.

With the great increase in the production of new varieties of florists' flowers, especially in Carnations and Chrysanthemums, the want is felt for some form of award which will recognize what good qualities are apparent in a new variety, but will give such instructions to the originator as will prevent him from making use of this award for advertising purposes and giving to the trade a variety which does not bear our full approval. We have adopted a form of award which we call a Complimentary Notice and which is in the nature of a letter of advice to the originator.

The interest in Aquatics has been so marked that we anticipate some very interesting displays on the earlier date on which additional prizes will be offered next season.

During the early part of the season the tables were brightened by many choice displays; those of forced Wistaria by Francis Brown Hayes were particularly beautiful and were made for four consecutive Saturdays, beginning February 11. On the same date Honorable Mention was awarded to Arthur H. Fewkes, for a seedling Scarlet Geranium of great promise.

On March 4, J. McGregor showed a seedling Crimson Carnation, Jacqueminot, which was remarkable for its clear color, large size, and fine stem. A First Class Certificate of Merit was awarded to him for this variety.

SPRING EXHIBITION.

March 21, 22, 23, and 24.

The cut flower department of this otherwise excellent exhibition was not equal to former years, although there were some very fine displays. The competition in the classes for Roses was very meagre, there being none in the Hybrid Perpetuals and only two competitors in the Teas.

The Carnations were quite well represented. The best Crimson shown in competition was F. Mangold; the best Pink, The Princess; the best Scarlet, Hector; the best White, Mrs. Fisher; and the best Yellow, Buttercup.

Violets and Pansies were very well shown.

Joseph Tailby & Son were awarded a First Class Certificate of Merit for their seedling self yellow Carnation, Henriette Sargent; and George B. Gill and Arthur H. Fewkes were awarded Honorable Mention for seedling Carnations; Siebrecht & Wadley, of New Rochelle, N. Y., for a new Hybrid Tea Rose, and John N. May, of Summit, N. J., for Hybrid Tea Rose, Mrs. W. C. Whitney.

MAY EXHIBITION.

May 6.

Cut flowers at this show were not numerous but there were some very fine collections of Pansies and Narcissuses shown. The native plants attracted much attention, as these early wild flowers are always sure to do. Two new Carnations, of a deep pink color, were shown by William Nicholson. The one named Nicholson

was of great size as well as good color; the other, Ada Byron, was similar in color and remarkably fragrant. Honorable Mention was awarded them.

From the May Show until the Rhododendron Show, the exhibits increased in excellence each week, as the late spring flowers began to come in.

RHODODENDRON SHOW.

June 13 and 14.

This show was postponed one week from the regular date, June 6 and 7, on account of the lateness of the season. It was undoubtedly the most successful show of this kind we have ever held. The displays of Rhododendrons were wonderful, the principal exhibitors being Francis Brown Hayes, H. H. Hunnewell, John L. Gardner, Joseph Clark, Samuel J. Trepess, and Edwin Sheppard & Son.

The collection from Francis Brown Hayes was especially remarkable, filling the greater part of the tables in the lower hall as well as the entire stage. He was awarded a Gold Medal for this display.

The Pæonies shown were the best we have had for many years.

The display of Flowering Trees and Shrubs from Hon. Joseph S. Fay, was a very attractive exhibit and filled the entire stage in the upper hall. The Hawthorns and Laburnums were very noticeable among them. A Silver Medal was awarded him for this display.

It was a little late for the Hardy Azaleas and consequently the displays of these were not as good as usual, but in all other seasonable garden flowers — German Irises, Hardy Pyrethrums, Papavers, and all other kinds of Hardy Herbaceous Plants — the displays were numerous and of great excellence.

J. W. Manning was awarded a First Class Certificate of Merit for a very large and finely colored variety of *Papaver orientale*.

ROSE SHOW.

June 22 and 23.

This show was also postponed from the 20th, making it two days later. It was fully equal to any we have had in late years, and the prizes were quite generally competed for.

As has been the case for several years previous, the finest roses came from the southern part of the State — Wood's Holl and New Bedford.

In the class for a single bloom of a variety introduced since 1890, Hon. Joseph S. Fay took all three prizes with the varieties Margaret Dickson, Mrs. Paul, and Duke of Fife, in the order named.

Margaret Dickson is in the way of Merveille de Lyon, but with more color and very fine foliage.

Mrs. Paul is a very large flower with reflexed petals, light rose in color, with darker shadings.

Duke of Fife is a large, broad petalled flower with full centre, bright crimson in color and fragrant. The foliage is large and bold.

The miscellaneous displays were quite numerous and many excellent things were shown.

Thomas C. Thurlow made a magnificent display of Herbaceous Pæonies, for which the Appleton Silver Medal was awarded him.

Jackson Dawson showed an interesting lot of seedling Hybrid Roses, two of which were awarded First Class Certificates of Merit. No. 2, a cross between Multiflora and Miss Hassard, has the foliage of the latter but with the habit of the former, only with much larger flowers and beautifully crimped petals; the color is pure white. No. 3 is a cross between Multiflora and Gen. Jacqueminot, with the same sized flower as Multiflora but double and slightly tinged with pink.

Hicks Arnold was awarded a First Class Certificate of Merit for *Lælia Arnoldianum*.

The weekly exhibitions from July 1 to the Annual Exhibition, sustained their usual excellence but there was little of which to make special mention. The displays of roses the week after the regular Rose Show were fully equal to those then shown, and Mr. M. H. Walsh exhibited his new seedling Hybrid Perpetual Rose, named by his employer, Hon. Joseph S. Fay, the Michael H. Walsh. This is a magnificent, fragrant rose, in the way of Baron de Bonstetten but of a much richer crimson, very large, with strong wood and bold foliage. A First Class Certificate of Merit was awarded this rose.

July 29, Fisher Brothers & Co. were awarded a First Class Certificate of Merit for their new pure white Sweet Pea, Snowflake.

August 12, Thomas H. Flynn was awarded a First Class Certificate of Merit for the new Canna, Florence Vaughn.

August 26 was Aster day, and the Large Flowered varieties were well represented, the prizes being all strongly competed for.

ANNUAL EXHIBITION OF PLANTS AND FLOWERS.

September 6 and 7.

The public is seldom treated to a more beautiful display of flowers than was put before them at this exhibition. Asters, Dahlias, and Zinnias have seldom been better shown. Among the cut flowers the Aquatics were the centre of attraction. Two fine displays of these were made, by John Simpkins, and William Tricker of Dongan Hills, Staten Island, N. Y., the latter was awarded Honorable Mention for the new *Nymphæa tuberosa hybrida*.

The native plants attracted much attention and seemed to be thoroughly appreciated by a large number of visitors.

Owing to cold and windy weather just previous to the exhibition, the displays of Flowering Cannas were far from satisfactory, which was quite unfortunate, for their brilliant flowers are a welcome addition to the exhibition.

September 23 was prize day for Native Asters, and larger and better displays were made than ever before, forming a very attractive exhibition.

September 30 Jackson Dawson exhibited his new, fall flowering Astilbe, *A. Chinensis* var. *Japonica*, which is remarkable for its late season of blooming. A First Class Certificate of Merit was awarded him for it.

October 4, J. Warren Clark made a fine display of seedling Gladioli, including many distinct and choice varieties. A Silver Medal was awarded him for the collection.

October 14, a new seedling Canna was shown by A. H. Fewkes, with large spotted yellow flowers, for which a First Class Certificate of Merit was awarded.

October 28, J. F. Clark exhibited a seedling Chrysanthemum, No. 1, '93, somewhat in the way of the variety Banquet, but fuller and deeper yellow in color; a very fine early yellow. A First Class Certificate of Merit was awarded this for good quality combined with earliness.

CHRYSANTHEMUM SHOW.

NOVEMBER 7, 8, 9, AND 10.

This was one of the most successful Chrysanthemum Shows we have ever held—not so much in point of numbers as in the general perfection of the flowers shown. It seems as though the limit of size, combined with fine texture, has been reached, for it would appear next to impossible to develop Chrysanthemum flowers to greater size than some of the specimens shown by John Simpkins, and the scarcely inferior ones shown by several other exhibitors.

The prizes in the principal classes were all well competed for, and there were many exhibits not in competition. The special prizes offered by Miss Simpkins and Edward Hatch did not bring out as much competition as could be wished, probably owing to the late date at which the prizes were offered. The greatest competition was shown in the class for twenty-five blooms of twenty-five varieties, and in the classes for seedlings. There were nearly forty entries in the latter classes and many beautiful varieties were presented. One shown by Pitcher & Manda of Short Hills, N. J., and named Pitcher & Manda, was a most distinct departure, it being a very large, full, double, somewhat flat flower; white, with the centre florets clear yellow, producing a very striking effect.

First Class Certificates of Merit were awarded to Pitcher & Manda for Chrysanthemums Pitcher & Manda and Dorothy Toler; to Mann Brothers for Chrysanthemum Mutual Friend; Theophilus D. Hatfield for Chrysanthemum A. H. Fewkes; Sewall Fisher for Carnation Nicholson; Edwin Lonsdale, Philadelphia, Pa., for Carnation Helen Keller, and William Edgar for a vase of Mignonette Edgar's Improved.

Complimentary Notices were issued to James Wheeler for Chrysanthemum Mrs. Joseph H. White; James Brydon for Chrysanthemum Portia; T. D. Hatfield for Chrysanthemum J. Pethers, and to Sewall Fisher for Carnation Ada Byron.

A Silver Medal was awarded to A. H. Fewkes for Seedling Canna No. 2, '93.

The Shady Hill Nursery Co., having obtained the greatest number of first prizes throughout the season for Herbaceous Plants, became entitled to the Appleton Silver Medal. As no other competitor has exhibited more than once the Bronze Medal is withheld.

We lament the loss by death of one of our number, Mr. E. H. Hitchings, who had served with us so long and faithfully. We not only miss his presence among us, but we miss the choice collections of rare wild flowers he so delighted to collect and exhibit.

The Committee have awarded during the year one Gold Medal, three Society's Silver Medals, two Appleton Silver Medals, nineteen First Class Certificates of Merit, Nine Honorable Mentions, and five Complimentary Notices.

The amount appropriated for the year 1893, was	$2,400 00
We have awarded in prizes and gratuities, including medals	$2,340 00
Leaving an unexpended balance of	$60 00

We have also awarded in Special Prizes the amount of $80.00.

All of which is respectfully submitted,

For the Committee,

ARTHUR H. FEWKES,
Chairman.

PRIZES AND GRATUITIES AWARDED FOR FLOWERS.

January 7.

Gratuities: —

Francis Brown Hayes, Basket of Camellias	$2 00
Mrs. A. D. Wood, Cut Flowers	1 00
Mrs. E. M. Gill, " "	1 00
George McWilliam, Lælias	1 00

January 14.

Gratuities: —

George B. Gill, Carnations	1 00
" " " Cut Flowers	1 00

February 4.

Orchids.— Display of species and varieties, filling not less than twenty bottles, E. W. Gilmore	15 00
Second, John L. Gardner	10 00
Carnations.— Display of cut blooms, with foliage, not less than six varieties, in vases, Richard T. Lombard	5 00
Camellias.— Display of named varieties, cut flowers with foliage, not less than six varieties, in vases, Francis Brown Hayes	4 00
Second, John L. Gardner	3 00

Gratuities: —

George B. Gill, Carnations	1 00
Charles E. Richardson, *Acacia longifolia*	1 00
Rose Buxton, *Lilium Harrisii*	1 00
H. K. Southworth, Vase of Pinks	1 00
Mrs. A. D. Wood, Cut Flowers	2 00
Mrs. E. M. Gill, Basket of Flowers	1 00

February 11.

Gratuities: —

Francis Brown Hayes, Camellias and Cut Flowers	3 00
" " " Forced Wistaria	2 00
Mrs. A. D. Wood, Cut Flowers	1 00

February 18.

Gratuities: —

Francis Brown Hayes, Pyramid of Wistaria and vase of Camellias	8 00
George S. Harwood, Five varieties of Violets	1 00

FEBRUARY 25.

Gratuities: —

Francis Brown Hayes, Display of Roses and Wistaria	$5 00
H. H. Hunnewell, *Clematis indivisa*	2 00
H. L. Southworth, Vase of Carnations J. J. Harrison and Nellie Lewis	1 00
James McGreggor, Seedling Crimson Carnation	1 00
Mrs. E. M. Gill, Cut Flowers	2 00

MARCH 4.

Gratuities: —

Francis Brown Hayes, Roses, Wistaria, etc.	6 00
J. C. Rogers, Roses, Carnations, etc.	3 00
George B. Gill, Seedling Carnations	1 00
Joseph H. White, Callas	1 00
Mrs. A. D. Wood, Cut Flowers	3 00
Mrs. E. M. Gill " "	1 00

MARCH 11.

Gratuities: —

Francis Brown Hayes, Roses, etc.	4 00
Mrs. E. M. Gill, Cut Flowers	1 00

SPRING EXHIBITION.

MARCH 21, 22, 23, AND 24.

TENDER ROSES IN VASES.— Twelve blooms of Catherine Mermet, J. Newman & Son	$8 00
Second, Peck & Sutherland	6 00
Twelve blooms of The Bride, J. Newman & Son	8 00
Second, Peck & Sutherland	6 00
PANSIES. — Forty-eight cut blooms, not less than twenty-four varieties, Hon. Joseph S. Fay	4 00
Second, H. K. Southworth	3 00
Third, William Patterson	2 00
VIOLETS.— Best collection of varieties, fifty blooms of each in a bunch, Nathaniel T. Kidder	4 00
Second, Harry S. Rand	3 00
Third, William Patterson	2 00
CARNATIONS.— Twelve blooms of any named crimson variety, E. G. Bridge, for F. Mangold	3 00
Twelve blooms of any named pink variety, Galvin Brothers, for The Princess	3 00
Twelve blooms of any named scarlet variety, E. G. Bridge, for Hector	3 00
Twelve blooms of any named white variety, E. G. Bridge, for Mrs. Fisher	3 00

Twelve blooms of any named yellow variety, H. K. Southworth, for Buttercup	$3 00
Centre Piece.— Mrs. A. D. Wood	8 00
Second, Norton Brothers	6 00
Gratuities: —	
Bussey Institution, Cherokee Roses	2 00
Hon. Joseph S. Fay, three dishes of Pansies	2 00
Richard T. Lombard, Vase of Carnations	3 00
Peter Fisher & Co., New Carnation, Jacqueminot,	2 00
Siebrecht & Wadley, New Rochelle, N. Y., Cut Orchids	2 00
E. Sheppard & Son, Orchids and Azaleas	3 00
Harry S. Rand, Vase of Sweet Peas	1 00
Nathaniel T. Kidder, *Iris Susiana*	1 00
Francis Brown Hayes, Cut Flowers	7 00
Mrs. A. D. Wood, " "	5 00
Mrs. E. M. Gill, " "	1 00

April 15.

Gratuity: —	
Francis Brown Hayes, *Mackaya bella*	1 00

April 29.

Gratuities: —	
Mrs. E. M. Gill, Cut Flowers	2 00
Mrs. P. D. Richards, Wild Flowers	1 00

MAY EXHIBITION.

May 6.

Hardy Narcissuses.— Collection of not less than ten named varieties of blooms, John L. Gardner	6 00
Pansies.— Forty-eight cut blooms, not less than twenty-four varieties, Hon. Joseph S. Fay	5 00
Second, Denys Zirngiebel	4 00
Third, " "	3 00
Basket of Flowers.— Mrs. A. D. Wood	6 00
Native Plants.— Collection, not exceeding thirty bottles, Mrs. P. D. Richards	5 00
Gratuities: —	
Hon. Joseph S. Fay, Display of Pansies	5 00
Francis Brown Hayes, Cut Flowers	3 00
John L. Gardner, Hyacinths	1 00
Mrs. E. M. Gill, Cut Flowers	1 00

May 13.

Gratuities: —	
Bussey Institution, Collection of Hardy Narcissuses	3 00
Francis Brown Hayes, Cut Shrubs	2 00

Mrs. E. M. Gill, Cut Flowers	$2 00
Mrs. P. D. Richards, Native Plants	1 00

MAY 20.

Gratuities: —

Nathaniel T. Kidder, Tulips and Streptocarpus	5 00
Dr. C. G. Weld, Tulips and Narcissuses	4 00
Francis Brown Hayes, Cut Flowering Shrubs	4 00
J. Willard Hill, Pansies	1 00
Mrs. A. D. Wood, Cut Flowers	4 00
Mrs. E. M. Gill, " "	2 00
Mrs. P. D. Richards, Wild Flowers,	3 00

MAY 27.

Gratuities: —

Francis Brown Hayes, Cut Flowering Shrubs	4 00
Bussey Institution, Collection of Darwin Tulips	2 00
" " Collection of Species of Tulips	1 00
Mrs. P. D. Richards, Wild Flowers	2 00

JUNE 3.

Gratuities: —

H. H. Hunnewell, Rhododendrons	4 00
Francis Brown Hayes, Cut flowering Trees and Shrubs	4 00
" " " Collection of Pyrethrums	2 00
Shady Hill Nursery Co., Tree Pæonies	2 00
Benjamin D. Hill, Tree Pæonies and Lilacs	1 00
Walter H. Cowing, Collection of Aquilegias	1 00
Mrs. A. D. Wood, Cut Flowers	1 00
Mrs. E. M. Gill, " "	1 00
Mrs. P. D. Richards, Wild Flowers	2 00

JUNE 10.

Gratuities: —

Francis Brown Hayes, Display of Rhododendrons	10 00
J. W. Manning, Collection of Herbaceous Plants	2 00
William C. Strong, Collection of Pyrethrums	1 00
Mrs. Mary T. Goddard, Display of Clematis	1 00
Benjamin D. Hill, Clematis and Pæonies	1 00

RHODODENDRON SHOW.

JUNE 13 AND 14.

H. H. Hunnewell Premiums.

RHODODENDRONS. — Twelve distinct Hardy varieties, named, Samuel J. Trepess, a piece of plate valued at	20 00
Second, John L. Gardner, a piece of plate valued at	15 00
Six distinct Hardy varieties, named, Samuel J. Trepess	10 00

Second, Joseph Clark	$5 00
Single truss of any Tender variety, named, Joseph Clark	2 00
Second, John L. Gardner	1 00
HARDY AZALEAS.— From any or all classes, fifteen varieties, one vase of each, Thomas C. Thurlow	8 00
Cluster of trusses, one variety, Thomas C. Thurlow	2 00

Society's Prizes.

HERBACEOUS PÆONIES.—Twelve named varieties, Arthur H. Fewkes	10 00
Second, John L. Gardner	8 00
GERMAN IRISES.— Six distinct varieties, one spike of each, Mrs. E. M. Gill	3 00
Second, Mrs. A. D. Wood	2 00
HARDY PYRETHRUMS.— Display, Dr. C. G. Weld	3 00
Second, Shady Hill Nursery Co.	2 00
HARDY FLOWERING TREES AND SHRUBS.— Collection of thirty species and varieties, named, cut blooms, Nathaniel T. Kidder	8 00
HERBACEOUS PLANTS.— Thirty bottles, J. W. Manning	8 00
Second, Shady Hill Nursery Co.	6 00
BASKET OF FLOWERS.— Mrs. A. D. Wood	5 00
Second, Mrs. E. M. Gill	4 00
NATIVE PLANTS.— Collection, not exceeding thirty bottles, of named species and varieties, Mrs. P. D. Richards	5 00

Gratuities: —

H. H. Hunnewell, Display of Rhododendrons and Azaleas	20 00
John L. Gardner, Collection of Rhododendrons, etc.	6 00
F. W. Vanderbilt, Newport, R. I., Collection of Rhododendrons	3 00
O. B. Hadwen, Collection of Rhododendrons	1 00
E. Sheppard & Son, Hardy Azaleas and Rhododendrons	2 00
Joseph Clark, Rhododendrons and *Clematis montana*	2 00
Thomas C. Thurlow, Collection of Hardy Azaleas	2 00
" " " Collection of Pæonies	5 00
Leverett M. Chase, Pæonies	1 00
Mrs. E. M. Gill, Irises, Pæonies, etc.	3 00
Mrs. Mary T. Goddard, Clematis	3 00
Benjamin D. Hill, Clematis, etc.	1 00
Mrs. E. M. Gill, Hardy Pyrethrums	1 00
Nathaniel T. Kidder, Collection of Herbaceous Plants	4 00
Rea Brothers, Herbaceous Plants	1 00
Walter H. Cowing, Collection of Aquilegias	3 00
William H. Spooner, Hybrid Roses	3 00
Mrs. A. A. Johnson, Laurel	3 00
E. Sheppard & Son Pelargoniums	2 00
Fisher Brothers & Co., Vase of Canna Mme. Crozy	1 00
Elisha S. Converse, Tuberous Begonias	1 00
Mrs. A. D. Wood, Cut Flowers	3 00

ROSE EXHIBITION.

JUNE 22 AND 23.

Special Prize, Theodore Lyman Fund.

HARDY PERPETUAL ROSES.— Twenty-four distinct named varieties, three of each variety, Hon. Joseph S. Fay	$35 00
Second, Dr. C. G. Weld	30 00
Third, John L. Gardner	25 00

Special Prizes Offered by the Society.

Six blooms of John Hopper, Nathaniel T. Kidder	5 00
Six blooms of Marquise de Castellane, Nathaniel T. Kidder	5 00
Second, Dr. C. G. Weld	4 00
Six blooms of Mme. Gabriel Luizet, Nathaniel T. Kidder	5 00
Second, Dr. C. G. Weld	4 00
Twelve blooms of any other variety, Hon. Joseph S. Fay, Gen. Jacqueminot	7 00
Second, Nathaniel T. Kidder, Magna Charta	5 00

Regular Prizes.

Sixteen distinct named varieties, three of each variety, Hon. Joseph S. Fay	20 00
Twelve distinct named varieties, three of each variety, Hon. Joseph S. Fay	15 00
Second, William Patterson	10 00
Six distinct named varieties, three of each variety, J. Eaton Jr.	15 00
Second, Joseph H. White	10 00
Third, Hon. Joseph S. Fay	8 00
Three distinct named varieties, three of each, Hon. Joseph S. Fay	10 00
Second, Hon. Joseph S. Fay	8 00
Third, " " " "	5 00
Twenty-four distinct named varieties, one of each, Hon. Joseph S. Fay	15 00
Second, John L. Gardner	10 00
Third, William H. Spooner	8 00
Eighteen distinct named varieties, one of each, Hon. Joseph S. Fay	12 00
Second, John L. Gardner	8 00
Third, William H. Spooner	6 00
Twelve distinct named varieties, one of each, Francis Brown Hayes	10 00
Second, Nathaniel T. Kidder	6 00
Third, J. Eaton Jr.	4 00
Six distinct named varieties, one of each, Hon. Joseph S. Fay	6 00
Second, John L. Gardner	4 00
Third, Francis Brown Hayes	3 00
Three distinct named varieties, one of each, Dr. C. G. Weld	3 00

Second, John L. Gardner	$2 00
Third, Hon. Joseph S. Fay	1 00
Best single bloom of a variety introduced since 1890, Hon. Joseph S. Fay, for Margaret Dickson	5 00
Second, Hon. Joseph S. Fay, for Mrs. Paul	4 00
Third, Hon. Joseph S. Fay, for Duke of Fife	3 00
Moss Roses.— Six distinct named varieties, three clusters of each, the third prize to John L. Gardner	3 00
General Display.— One hundred bottles of Hardy Roses, Francis Brown Hayes	10 00
Second, Mrs. E. M. Gill	9 00
Third, John L. Gardner	8 00
Fourth, Benjamin G. Smith	7 00
Fifth, George B. Gill	6 00
Tuberous Begonias.— Twelve spikes, of not less than four varieties, Elisha S. Converse	5 00
Second, E. W. Gilmore	4 00
Sweet Williams.— Thirty spikes, not less than six distinct varieties E. Sheppard & Son	4 00
Second, Walter H. Cowing	3 00
Third, Shady Hill Nursery Co.	2 00
Vase of Flowers.— Best arranged, in one of the Society's glass vases, Mrs. E. M. Gill	5 00
Second, Mrs. A. D. Wood	4 00

Gratuities : —

Hon. Joseph S. Fay, Roses	20 00
Francis Brown Hayes, Roses	12 00
William H. Spooner, Display of Roses	5 00
Dr. C. G. Weld, Roses	5 00
E. Sheppard & Son, Hardy Roses, etc.	3 00
Benjamin G. Smith, Hybrid Roses	1 00
George H. Lomax, " "	1 00
William C. Winter, Display of Roses	1 00
Hon. Joseph S. Fay, Moss Roses	3 00
John L. Gardner " "	2 00
Jackson Dawson, Display of seedling Hybrid Roses	2 00
Walter H. Cowing, Spanish Irises and Sweet Williams	1 00
O. B. Hadwen, Collection of Pæonies	3 00
Mrs. E. M. Gill, Pæonies	3 00
Benjamin D. Hill, Pæonies, etc.	3 00
Nathaniel T. Kidder, *Hydrangea scandens*	1 00
" " " *Syringa Pekinensis*	1 00
Isaac E. Coburn, Collection of Pelargoniums	1 00
Francis Brown Hayes, Foliage and Flowers	10 00
Botanic Garden of Harvard University, Display of Herbaceous Plants	8 00

R. & J. Farquhar & Co., Cut Flowers	$5 00
Mrs. Mary T. Goddard, " "	3 00
Rea Brothers, " "	1 00
Mrs. P. D. Richards, Wild Flowers	3 00

JULY 1.

ENGLISH IRISES.— Best Collection, Walter H. Cowing	3 00
DELPHINIUMS.— Collection of twenty spikes, R. & J. Farquhar & Co.	5 00
FOXGLOVES.— Twelve spikes, Nathaniel T. Kidder	2 00
Second, Walter H. Cowing	1 00
HERBACEOUS PLANTS.—Forty bottles, Shady Hill Nursery Co.	8 00
BASKET OF FLOWERS.— Mrs. A. D. Wood	5 00
Second, Mrs. E. M. Gill	4 00

Gratuities : —

Hon. Joseph S. Fay, Collection of Hardy Roses	15 00
Francis Brown Hayes, " " " "	15 00
J. Eaton Jr., " " " "	4 00
William H. Spooner, " " " "	2 00
Charles W. Parker, " " " "	1 00
Charles W. Parker, " " Roses	1 00
Nathaniel T. Kidder, " " Herbaceous Plants	4 00
Rea Brothers, Herbaceous Plants	1 00
Walter H. Cowing, Collection of Sweet Williams	2 00
Frederick S. Davis, " " " "	1 00
E. Sheppard & Son, " " " "	1 00
Walter H. Cowing, Vase of Shirley Poppies	1 00
Daniel D. Lee, Nymphæas	1 00
Benjamin D. Hill, Cut Flowers	1 00
Mrs. E. M. Gill, " "	1 00
Mrs. P. D. Richards, Wild Flowers	2 00

JULY 8.

VASE OF FLOWERS.— Best arranged, in one of the Society's glass vases, Mrs. A. D. Wood	4 00
Second, Mrs. E. M. Gill	3 00
NATIVE PLANTS.— Collection, not exceeding forty bottles, Mrs. P. D. Richards	5 00
Second, Walter E. Coburn	4 00

Gratuities : —

Joseph S. Fay, Hybrid Roses and Delphiniums	10 00
R. & J. Farquhar & Co., Delphiniums	3 00
Charles W. Parker, Hybrid Roses	2 00
Leverett M. Chase, *Lilium candidum*	4 00
Frederick S. Davis, " "	2 00
Bussey Institution, " "	2 00

Isaac E. Coburn, Pelargoniums, etc.	$3 00
E. Sheppard & Son, *Iris Kæmpferi*	3 00
Frederick S. Davis, " "	1 00
Bussey Institution, English Irises	1 00
Elisha S. Converse, Tuberous Begonias	1 00
Benjamin D. Hill, Cut Flowers	2 00
Mrs. E. M. Gill, " "	2 00

JULY 15.

PARLOR BOUQUETS.— Mrs. A. D. Wood	4 00
Second, Mrs. E. M. Gill	3 00
Third, George B. Gill	2 00
Gratuities : —	
Thomas C. Thurlow, Delphiniums	3 00
Charles W. Parker, Roses	2 00
E. Sheppard & Son, *Iris Kæmpferi*	2 00
Adin A. Hixon, Petunias, etc.	2 00
Isaac E. Coburn, Tuberous Begonias, etc.	2 00
Frederick S. Davis, Shirley Poppies	1 00
Francis Brown Hayes, Cut Flowers	4 00
Mrs. E. M. Gill, " "	2 00
Benjamin D. Hill, " "	2 00
Mrs. A. D. Wood, " "	1 00
Rea Brothers, " "	1 00
Mrs. S. H. Coleman, " "	1 00
Mrs. P. D. Richards, Wild Flowers	1 00
Miss Charlotte M. Endicott, Wild Flowers	1 00

JULY 22.

HOLLYHOCKS.— Double, twelve blooms, of twelve distinct colors, Hon. Joseph S. Fay	5 00
Second, E. Sheppard & Son	4 00
Six blooms, of six distinct colors, Hon. Joseph S. Fay	3 00
Second, Hon. Joseph S. Fay	2 00
Twelve spikes, Hon. Joseph S. Fay	5 00
GLOXINIAS.— Display of Cut Flowers, the second prize to E. S. Converse	3 00
NATIVE FERNS.— Best display, Mrs. P. D. Richards	5 00
Second, Walter E. Coburn	4 00
Gratuities :—	
Hon. Joseph S. Fay, Hollyhocks	10 00
Charles W. Parker, Roses	1 00
Joseph Breck & Sons Corporation, Collection of Sweet Peas	2 00
Walter E. Coburn, Sweet Peas, etc.	2 00
Charles E. Richardson, *Lilium auratum* and *Lilium speciosum* Melpomene	1 00

Hon. Joseph R. Leeson, *Magnolia fœtida*	$1 00
Daisy Vivian, Nasturtiums	1 00
Benjamin D. Hill, Clematis, etc.	1 00
Rea Brothers, Herbaceous Plants	1 00
Francis Brown Hayes, Cut Flowers	3 00
Mrs. E. M. Gill, " "	2 00
Mrs. A. D. Wood, " "	2 00
E. Sheppard & Son, " "	1 00

JULY 29.

SWEET PEAS.— Display, filling thirty vases, Adin A. Hixon	6 00
Second, George S. Harwood	4 00
Third, Mrs. E. M. Gill	3 00
HERBACEOUS PLANTS.— Forty bottles, Shady Hill Nursery Co.	8 00
BASKET OF FLOWERS.— Mrs. E. M. Gill	4 00
Second, Mrs. A. D. Wood	3 00
Gratuities :—	
Hampden Co. Horticultural Society, Sweet Peas	3 00
George S. Harwood, Sweet Peas	3 00
Nathaniel T. Kidder, Herbaceous Plants	5 00
Joseph Burnett, Hollyhocks	5 00
Daniel D. Lee, Water Lilies	2 00
Adin A. Hixon, Petunias	2 00
John Parker, Dahlias and Cut Flowers	1 00
Francis Brown Hayes, Cut Flowers	4 00
Walter E. Coburn, " "	2 00
E. Sheppard & Son, " "	2 00
Benjamin D. Hill, " "	2 00
Mrs. E. M. Gill, " "	2 00
Rea Brothers, " "	1 00
Mrs. P. D. Richards, Wild Flowers	2 00

AUGUST 5.

PERENNIAL PHLOXES.— Ten distinct named varieties, Thomas C. Thurlow	5 00
Second, Shady Hill Nursery Co.	4 00
Third, Rea Brothers	3 00
VASE OF FLOWERS.— Mrs. A. D. Wood	4 00
Second, Mrs. E. M. Gill	3 00
NATIVE FLOWERS.— Collection, not exceeding forty bottles, Mrs. P. D. Richards	5 00
Second, Misses Eleanor and Mollie Doran	4 00
Third, Walter E. Coburn	3 00
Gratuities :—	
R. W. Williams, Salpiglossis	1 00
Elisha S. Converse, Begonias	1 00

Francis Brown Hayes, Cut Flowers	$3 00
Mrs. E. M. Gill, " "	2 00
Mrs. S. H. Coleman, " "	1 00
Agnes A. Fisher, Native Flowers	1 00

AUGUST 12.

GLADIOLI.— Twenty named varieties, in spikes, Francis Brown Hayes	6 00
Ten named varieties, in spikes, Francis Brown Hayes	3 00
Six named varieties, in spikes, " " "	2 00
Display of named and unnamed varieties, filling one hundred vases, George M. Anderson	8 00
PHLOX DRUMMONDI.— Thirty vases, not less than six varieties, Mrs. Mary T. Goddard	4 00
Second, William Patterson	3 00

Gratuities :—

George M. Anderson, Gladioli	2 00
Francis Brown Hayes, Roses, Phlox, etc.	4 00
Adin A. Hixon, Petunias and Sweet Peas	4 00
Walter E. Coburn, Sweet Peas and Petunias	2 00
Edwin S. Hill, Collection of Petunias	1 00
John C. Hovey, *Ipomœa leptophylla*	1 00
E. Sheppard & Son, Zinnias, etc.	1 00
John Parker, Collection of Dahlias	2 00
William C. Winter, Collection of Dahlias and Begonias	2 00
Mrs. E. M. Gill, Cut Flowers	1 00
Mrs. P. D. Richards, Wild Flowers	2 00

AUGUST 19.

Gratuities :—

J. Warren Clark, Gladioli	4 00
E. Sheppard & Son, "	3 00
Dr. C. G. Weld, "	2 00
William E. Endicott, Seedling Gladioli	1 00
William C. Strong, Gladioli and Lilies	1 00
Walter E. Coburn, Petunias and Begonias	2 00
Aaron Lummus, Dahlias	2 00
John Parker, "	2 00
Nathaniel T. Kidder, Asters	3 00
Mrs. S. H. Coleman, "	1 00
Mrs. E. M. Gill, Zinnias	1 00
Rea Brothers, Perennial Phlox	1 00
Benjamin D. Hill, Clematis	1 00
Francis Brown Hayes, Cut Flowers	8 00
George Hollis, Native Asters	1 00

AUGUST 26.

ASTERS.— Large Flowered, of all classes, fifty vases, not less than twelve varieties, William Patterson	$5 00
Second, Charles H. Yates	4 00
Third, Francis Brown Hayes	3 00
Truffaut's Pæony Flowered, thirty blooms, not less than twelve varieties, F. P. Alexander	5 00
Second, Joseph H. White	4 00
Victoria Flowered, thirty blooms, not less than twelve varieties, Nathaniel T. Kidder	5 00
Second, William Patterson	4 00
Pompon, thirty cut plants, not less than six varieties, the second prize to Adin A. Hixon.	3 00
HERBACEOUS PLANTS.— Forty bottles, Shady Hill Nursery Co.	8 00
Gratuities: —	
Francis Brown Hayes, Asters	12 00
E. Sheppard & Son, "	2 00
Charles H. Yates, "	1 00
Rea Brothers, Herbaceous Plants	1 00
J. Warren Clark, Gladioli	4 00
Mrs. E. M. Gill "	1 00
Adin A. Hixon, Petunias and Tuberous Begonias	2 00
John Parker, Dahlias	2 00
E. Sheppard & Son, Dahlias	1 00
Aaron Lummus "	1 00
Benjamin D. Hill, Clematis, etc.	1 00

ANNUAL EXHIBITION OF PLANTS AND FLOWERS.

SEPTEMBER 6 AND 7.

Special Prize, Theodore Lyman Fund.

AQUATIC PLANTS.— Display, including not less than twelve flowers of Nymphæas and Nelumbiums, John Simpkins	30 00
Second, William Tricker, Dongan Hills, N. Y.	20 00

Regular Prizes.

ASTERS.— Collection of fifty varieties, one flower in each vase, Charles H. Yates	5 00
Second, William Patterson	4 00
Third, Francis Brown Hayes	3 00
DAHLIAS.— Double, twelve blooms, distinct named varieties, John Parker	6 00
Second, William C. Winter	5 00
Third, " " "	4 00

Six blooms, distinct named varieties, William C. Winter	$4 00
Second, William C. Winter	3 00
Third, John Parker	2 00
Specimen bloom, John Parker	2 00
Second, William C. Winter	1 00
Liliputian, display, twenty-five bottles, not less than eight named varieties, William C. Winter	4 00
Second, William C. Winter	3 00
Third, Aaron Lummus	2 00
LILIUM LANCIFOLIUM.— Collection of named varieties, the second prize to Benjamin D. Hill	3 00
TROPÆOLUMS.— Display, filling twenty-five vases, William Patterson	4 00
Second, A. L. Cain	3 00
MARIGOLDS.— Display, filling twenty-five vases, Mrs. E. M. Gill,	3 00
Second, A. L. Cain	2 00
CANNAS.— Collection of not less than ten named varieties, in spikes, with foliage, David Fisher	6 00
TUBEROUS BEGONIAS.— Twelve spikes, not less than four varieties, Walter E. Coburn	5 00
Second, Elisha S. Converse	4 00
Third, William C. Winter	3 00
DOUBLE ZINNIAS.— Twenty-five flowers, not less than six varieties, E. Sheppard & Son	4 00
Second, Francis Brown Hayes	3 00
Third, Mrs. E. M. Gill	2 00
DIANTHUS.— Collection of Annual and Biennial varieties, filling fifty bottles, William Patterson	4 00
BASKET OF FLOWERS.— Mrs. A. D. Wood	4 00
Second, Mrs. E. M. Gill	3 00
NATIVE PLANTS.— Collection, not exceeding forty bottles, Misses Eleanor and Mollie Doran	5 00
Second, Mrs. P. D. Richards	4 00

Gratuities: —

Charles H. Yates, Asters	4 00
William C. Winter, Dahlias	4 00
Rea Brothers, Cactus Dahlias	1 00
J. Warren Clark, Gladioli	6 00
David Fisher, *Clematis paniculata*	2 00
Walter E. Coburn, Petunias and Begonias	3 00
Mrs. Julia A. Cain, Geraniums and other Cut Flowers	2 00
William Patterson, Gloxinias	1 00
Francis Brown Hayes, Display of Flowers	10 00
Mrs. A. D. Wood, Cut Flowers	2 00
Benjamin D. Hill, " "	2 00
E. Sheppard & Son, " "	1 00

SEPTEMBER 16.

HERBACEOUS PLANTS.— Forty bottles, Shady Hill Nursery Co.	$8 00
Gratuities: —	
Nathaniel T. Kidder, Herbaceous Plants	5 00
Rea Brothers, " "	2 00
J. Warren Clark, Gladioli	5 00
R. & J. Farquhar & Co., Collection of Cannas	4 00
William C. Winter, Dahlias and Tuberous Begonias	4 00
Walter E. Coburn, Petunias, Pansies, and Begonias	3 00
Ettore Tassinari, Phlox and Zinnias	2 00
Elisha S. Converse, Tuberous Begonias	1 00
Francis Brown Hayes, Cut Flowers	4 00
Mrs. E. M. Gill, " "	1 00
Benjamin D. Hill, " "	1 00

SEPTEMBER 23.

PERENNIAL ASTERS.— Display of native or introduced species and varieties, George Hollis	5 00
Second, Mrs. P. D. Richards	4 00
Third, Shady Hill Nursery Co.	3 00
Gratuities: —	
William C. Winter, Dahlias	5 00
John Parker, "	3 00
J. Warren Clark, Gladioli	2 00
Rea Brothers, Herbaceous Plants	1 00
Mrs. A. D. Wood, Cut Flowers	1 00
Mrs. E. M. Gill, " "	1 00
Benjamin D. Hill, " "	1 00

SEPTEMBER 30.

Gratuity:—	
Francis Brown Hayes, Rhododendrons and Begonias	1 00

OCTOBER 4.

Gratuities: —	
L. W. Goodell, Pansies, Begonias, Phlox, etc.	4 00
E. Frank Close, Tuberous Begonias	1 00
Francis Brown Hayes, Cut Flowers and Foliage	7 00
Mrs. A. D. Wood, Cut Flowers	2 00

CHRYSANTHEMUM SHOW.

NOVEMBER 7, 8, 9, AND 10.

Special Prizes from the Josiah Bradlee Fund.

CHRYSANTHEMUMS. — Twenty-five blooms of twenty-five distinct varieties, named, Joseph H. White, a piece of plate, or value in money	20 00
Second, Elijah A. Wood	15 00
Third, Dr. C. G. Weld	10 00

Six vases of six named varieties, ten blooms each, Charles V. Whitten	$30 00
Second, Mrs. A. D. Wood	25 00

Special Prize Offered by Miss Simpkins.

Twelve cut blooms of any pink Chrysanthemum, Edmund M. Wood & Co., variety Viviand Morel, a Silver Cup, value	40 00

Special Prizes Offered by Edward Hatch.

Best vase of twenty blooms of yellow Chrysanthemums, Charles V. Whitten, variety William H. Lincoln	25 00
Second, William Edgar, variety William H. Lincoln	15 00

Special Prizes Offered by the Society.

Best Seedling, never disseminated, three blooms, red, Joseph H. White, variety Mrs. Joseph H. White	5 00
Best Seedling, never disseminated, three blooms, pink, T. D. Hatfield, variety Sweet Brier	5 00
Best Seedling, never disseminated, three blooms, white, Mann Brothers, variety Mutual Friend	5 00
Best Seedling, never disseminated, three blooms, yellow, T. D. Hatfield, variety A. H. Fewkes	5 00
Best Seedling, never disseminated, three blooms, any other color, Pitcher & Manda, variety Pitcher & Manda	5 00

Regular Prizes.

Twelve cut blooms, Incurved, named, Joseph H. White	10 00
Twelve cut blooms, Japanese, named, John Simpkins	10 00
Second, Joseph H. White	6 00
Third, T. D. Hatfield	4 00
Twelve cut blooms, Japanese Incurved, named, Joseph H. White	10 00
Second, Elijah A. Wood	6 00
Third, T. D. Hatfield	4 00
Six cut blooms, Incurved, named, Joseph H. White	6 00
Second, Joseph H. White	4 00
Third, Elijah A. Wood	2 00
Six cut blooms, Japanese, named, John Simpkins	6 00
Second, Joseph H. White	4 00
Third, Elijah A. Wood	2 00
Six cut blooms, Japanese Incurved, named, John Simpkins	6 00
Second, Joseph H. White	4 00
Third, Elijah A. Wood	2 00
Six cut blooms, Reflexed, named, Elijah A. Wood	6 00
Second, Elisha S. Converse	4 00
Six cut blooms, Anemone, named, Dr. C. G. Weld	6 00

Vase of blooms, on long stems, arranged in the Society's large China vases, John Simpkins	$18 00
Second, Joseph H. White	16 00
Fourth, Mrs. E. M. Gill	12 00
Best vase of ten blooms, on long stems, red, named, Edmund M. Wood & Co., variety Cullingfordii	10 00
Second, Norris F. Comley, variety Alice Comley	8 00
Best vase of ten blooms, on long stems, pink, named, Edmund M. Wood & Co., variety Harry Balsley	10 00
Second, Edmund M. Wood & Co., variety Roslyn	8 00
Third, William Edgar, variety Mrs. Irving Clark	6 00
Best vase of ten blooms, on long stems, white, named, John Simpkins, variety Mrs. Jerome Jones	10 00
Second, Edmund M. Wood & Co., variety Niveus	8 00
Third, John Simpkins, variety Niveus	6 00
Best vase of ten blooms, on long stems, yellow, Edmund M. Wood & Co., variety Golden Wedding	10 00
Best vase of ten blooms, on long stems, any other color, named, Edmund M. Wood & Co., variety Harry May	10 00
Second, Edmund M. Wood & Co., variety Joey Hill	8 00

Gratuities: —

Francis Brown Hayes, Pyramid of Chrysanthemums and Pine Foliage	15 00
Francis Brown Hayes, Collection of Chrysanthemums	10 00
Mrs. A. D. Wood, Vase of Chrysanthemums	10 00
Mrs. A. D. Wood, Vase of blooms of Chrysanthemum Mrs. Jerome Jones	4 00
Joseph H. White, Collection of Chrysanthemums	3 00
Elisha S. Converse, " " "	3 00
George Putnam School, eight varieties of Hardy Chrysanthemums	3 00
J. F. Huss, Skeletonized Foliage and Flowers	5 00
Mann Brothers, Two vases Carnations, Daybreak and New Jersey	2 00
William Nicholson, Carnations	2 00
David Allan, Cut Orchids	2 00
William C. Winter, Tuberous Begonias	1 00

NOVEMBER 18.

Gratuities: —

Francis Brown Hayes, Collection of Chrysanthemums	5 00
George Sanderson, Carnations	1 00

DECEMBER 2.

Francis Brown Hayes, Collection of Chrysanthemums	3 00
T. D. Hatfield, Vase of Chrysanthemum Elderdown	2 00

SOCIETY'S GOLD MEDAL.

Rhododendron Show, June 13, 14. Francis Brown Hayes, Display of Rhododendrons.

SOCIETY'S SILVER MEDALS.

Rhododendron Show, June 13, 14. Hon. Joseph S. Fay, Display of Flowering Trees and Shrubs.
October 4. J. Warren Clark, Seedling Gladioli.
November 7. Arthur H. Fewkes, Seedling Canna 2–'93.

APPLETON SILVER MEDALS.

Shady Hill Nursery Co., Best Collection of Herbaceous Plants, exhibited at stated times during the season, as specified in the Schedule.
Rose Show, June 22 and 23. Thomas C. Thurlow, Collection of Herbaceous Pæonies.

FIRST CLASS CERTIFICATES OF MERIT.

March 4. James McGreggor, New Seedling Carnation Jacqueminot.
Spring Exhibition, March 21. Joseph Tailby & Son, Self Yellow Seedling Carnation Henriette Sargent.
Rhododendron Show, June 13, 14. J. W. Manning, Seedling *Papaver orientale.*
Rose Show, June 22, 23. Hicks Arnold, *Lælia Arnoldiana.*
" " " " Jackson Dawson, Seedling Hybrid Rose, No. 3, Multiflora × Gen. Jacqueminot.
" " " " Jackson Dawson, Seedling Hybrid Rose, No. 2, Multiflora × Miss Hassard.
July 1. M. H. Walsh, Seedling Hybrid Perpetual Rose Michael H. Walsh.
July 29. Fisher Brothers & Co., Seedling Sweet Pea Snowflake.
August 12. Thomas H. Flynn, New Canna Florence Vaughn.
September 30. Jackson Dawson, *Astilbe Chinensis* var. *Japonica.*
October 14. Arthur H. Fewkes, Seedling Canna 2–'93.
October 28. J. T. Clarke, Seedling Chrysanthemum 1–'93.
Chrysanthemum Show, November 7. Pitcher & Manda, Short Hills, N. J., Seedling Chrysanthemum Pitcher & Manda.
" " " " Pitcher & Manda, Seedling Chrysanthemum Dorothy Toler.
" " " " Mann Brothers, Seedling Chrysanthemum Mutual Friend.
" " " " T. D. Hatfield, Seedling Chrysanthemum A. H. Fewkes.
" " " " Edwin Lonsdale, Philadelphia, Pa., Seedling Carnation Helen Keller.
" " " " William W. Edgar, Seedling Mignonette Edgar's Improved.
" " " " Sewall Fisher, Seedling Carnation Nicholson.

HONORABLE MENTIONS.

February 11. Arthur H. Fewkes, Seedling Geranium.
Spring Exhibition, March 21. Arthur H. Fewkes, Seedling Carnations.
" " " " George B. Gill, " "
" " " " Siebrecht & Wadley, New Rochelle, N. Y., new Hybrid Tea Rose.
" " " " John N. May, Summit, N. J., new Hybrid Tea Rose Mrs. W. C. Whitney.
May 6, William Nicholson, Seedling Carnation Nicholson.
" " " " " " Ada Byron.
Rhododendron Show, June 13. Rea Brothers, *Lychnis flos cuculi alba plena.*
Annual Exhibition, September 6. William Tricker, Dongan Hills, N. Y., *Nymphæa tuberosa hybrida.*

COMPLIMENTARY NOTICES.

Chrysanthemum Show, November 7. James Wheeler, Seedling Chrysanthemum Mrs. Joseph H. White.
" " " " James Brydon, Seedling Chrysanthemum Portia.
" " " " T. D. Hatfield, Seedling Chrysanthemum Mrs. Pethers.
November 18. Norris J. Comley, Seedling Chrysanthemum 1-'93.
" " T. D. Hatfield, Seedling Chrysanthemum Eiderdown.
" " Sewall Fisher, Seedling Carnation Ada Byron.

REPORT

OF THE

COMMITTEE ON FRUITS,

FOR THE YEAR 1893.

By E. W. WOOD, CHAIRMAN.

If the exhibitions of fruit during the past season were to be taken as an indication of the fruit product of the State it would be conceded that there had been an abundant crop. Considering that it has been the off, or non-bearing, year for apples in the New England States and that a large portion of the fruit was blown from the trees in August and September, the exhibits have been unusually large. This fact together with similar results within the past few years indicates that under ordinary conditions the variation in the amount of the apple product has been growing less marked — a desirable change for both producer and consumer. The fruit has not been as fair and free from imperfections as when the injurious effects of the insect pests are distributed through an abundant crop, showing the necessity of spraying the trees and protecting the fruit.

Of pears there has been an abundant crop; the market has been over-supplied, and had it not been for the opportunities for cold storage, the returns, especially for the early varieties, would have disappointed the growers. Other conditions were unfavorable for the sale of pears; the general depression in business had its effect and an unusual supply of peaches was put on the market in competition with the earlier varieties.

The crop of peaches has been larger than for several years, and the opinion heretofore expressed in these reports, that improve-

ment in growing this fruit might be expected from raising seedling trees, seems to have received at least partial confirmation in the fact that the proportion of seedling fruit on exhibition has constantly increased for several years. It is claimed for the Crosby peach, a seedling recently introduced, that it passes through the winter with its fruit buds uninjured while the older varieties standing beside it fail to produce fruit. It is generally admitted that continued reproduction by buds and cuttings tends to weaken the constitution of plants and trees. The growers of the peach have been confined almost exclusively to a few varieties for many years; and during this time the trees have been attacked by a disease, often difficult to detect in its earlier stages, rendering it impossible to prevent the use of diseased pits and buds in the propagation of the old varieties. The most direct means of restoring vigor and fruitfulness to the peach would seem to be through growing seedling trees, first securing pits from healthy stock.

Plums have been shown in about the usual quantity, and we cannot look for a large increase in the exhibitions of this fruit until some successful means shall be discovered of combatting the black wart. Some encouraging attempts have been made at the Experiment Stations and it is believed that the difficulty may be overcome by spraying the trees with copper solutions. There have been some Japanese varieties of the plum of excellent quality recently introduced, and deserving the attention of fruit growers. It is claimed that they are not as liable to injury from the wart as the old varieties, but to this it may be answered that they have not been long enough under cultivation here to decide that point.

Very few cherries have been shown. It is surprising that a tree so easily grown and so ornamental, and at the same time bearing a desirable fruit, should be so much neglected. There is hardly any tree more beautiful than the heartshaped varieties of the cherry; growing in upright pyramidal form, with their thick, dark, glossy foliage they form an attractive feature when judiciously planted around the buildings.

Quinces have been shown in larger quantities than for several years. This fruit has not realized satisfactory prices in the market, which fact cannot be attributed to its quality, as it is one of the most desirable fruits for preserves and jellies, either alone or with other fruits, to which it imparts its peculiarly agreeable flavor. The Orange variety is the most generally grown, but the

finest specimens shown at the exhibitions were the Rea and Champion varieties.

The weekly exhibitions through the season have been well sustained. The amount of small fruits shown has been above the average in past years. The Strawberry Exhibition was interesting in various directions; the fruit as a whole was of superior quality; unusual interest was shown in the new varieties, and the competition in the different classes was more generally filled than usual. Of the new varieties the Marshall was easily the most marked; entered in four classes it took the first prize in every class. It is a very promising berry, and if its cultivation in other localities proves as successful as in the place of its origin, it must soon become one of the leading varieties. The Hersey Columbia took the first prize for any "new variety not previously exhibited." It is above medium size, of good form, dark color, and good quality. It is claimed to be an exceedingly good cropper, and seems to be promising and worthy of trial. It is gratifying to see the increased interest in growing seedling strawberries; experience has shown that the profitable life of most of the varieties of the strawberry has not lasted more than ten years, when they have been replaced by new and more desirable kinds. Any additions that will increase the size, or improve the quality, or extend the season by earlier or later varieties, will be welcomed by both growers and consumers.

At the Annual Fruit Exhibition, notwithstanding it was the off year for apples, there was an unusual amount of fruit shown. The pear exhibit was exceptionally large and of superior quality, and for the first time in many years every prize offered was awarded. A still more remarkable fact of this exhibition was that all the prizes offered for peaches were awarded, and at the exhibition of September 16, when a longer list of prizes was offered for peaches, all were awarded except for one variety.

Recognizing the fact that a large proportion of the preserved fruit sold in this market is imported from foreign countries, and that evaporated fruit had become an important and profitable industry in some of the states, the Committee of Arrangements have been considering for the past two years the propriety of inviting the dealers in preserved and evaporated fruits to make an exhibit in connection with our Annual Fruit Exhibition. As this would only show the finished product it was thought that an

exhibition of the process of manufacturing it might prove of more practical advantage to the fruit growers, and an invitation was extended to one of the largest concerns in the country, engaged in evaporating fruit largely for export trade, to bring one of their medium sized machines and keep it in operation during our Annual Exhibition. It proved a very interesting feature of the exhibition and attracted much attention. At the close of the exhibition the machine was purchased by the Agricultural College at Amherst, where it has been in operation up to the present time. The following statistics will show the importance of information on this subject to the fruit growers in Massachusetts. There were exported during the five years from 1870 to 1875, 13,348,746 pounds of evaporated fruit, returning a value of $716,894. For the five years from 1888 to 1893 the amount was 87,782,433 pounds, returning a value of $4,750,141. Of the evaporated fruit shipped during the last five years 62,300,000 pounds were shipped from New York and only 607,000 pounds from Boston.

As usual the fruit shown at the last exhibition, November 18, was the finest in quality of any shown during the year.

Of new fruits shown, F. H. Frazier, Danville, Indiana, exhibited, January 7, Arnold pears, a late seedling variety of very good quality, and was awarded a First Class Certificate of Merit. February 4, Edwanger & Barry, Rochester, N. Y., showed five varieties of winter pears; they were fair in quality but would be chiefly desirable for their late keeping qualities. They received Honorable Mention. September 6, Charles H. Hovey, East Pasadena, California, showed a very fine collection of oranges and lemons, and was awarded a Bronze Medal.

The Committee have awarded during the year in prizes and gratuities $1,592, leaving an unexpended balance of $208.

E. W. Wood,
Benj. G. Smith,
Chas. F. Curtis,
O. B. Hadwen,
Warren Fenno,
Samuel Hartwell,
J. W. Hill,

Committee on Fruits.

PRIZES AND GRATUITIES AWARDED FOR FRUITS.

JANUARY 7.

Gratuities : —

Asa Clement, Apples	$1 00
John L. Bird, Pears	1 00
F. H. Frazier, Danville, Indiana, Arnold Pears, First Class Certificate of Merit.	
Francis Brown Hayes, Japanese Lemons	1 00
G. L. Simmons, English Walnuts	1 00

FEBRUARY 4.

Gratuities : —

Ellwanger & Barry, Rochester, N. Y., New Winter Pears, Honorable Mention.	
William C. Eustis, Collection of Apples	2 00
Edwin A. Hall, Pears	1 00
A. H. Lewis, Apples and Pears	1 00

SPRING EXHIBITION.

MARCH 21, 22, 23, AND 24.

WINTER APPLES. — Baldwin, Marshall W. Chadbourne	3 00
Second, Rev. Calvin Terry	2 00
Third, O. B. Hadwen	1 00
Northern Spy, George C. Rice	3 00
Second, William T. Hall	2 00
Third, Asa Clement	1 00
Roxbury Russet, Asa Clement	3 00
Second, George Sanderson	2 00
Third, Elisha S. Converse	1 00
Tompkins King, George C. Rice	3 00
Second, William C. Eustis	2 00
Any other variety, O. B. Hadwen, Palmer	3 00
Second, Samuel Hartwell, Rome Beauty	2 00
Third, George Sanderson	1 00
WINTER PEARS.— Any variety, A. H. Lewis, Glout Morceau	3 00
Second, Edwin A. Hall, Winter Nelis	2 00

APRIL 6.

Gratuities : —

Warren Heustis & Son, Baldwin Apples	1 00
Edwin A. Hall, Collection of Pears	2 00

MAY 13.

Gratuities: —

William Brown, Peaches	$2 00
Benjamin P. Ware, Apples	1 00

MAY 20.

Gratuity: —

William Brown, Peaches	2 00

JUNE 13.

Gratuity: —

Winter Brothers, Peaches	2 00

ROSE AND STRAWBERRY EXHIBITION.

JUNE 22 AND 23.

Special Prizes from the Theodore Lyman Fund.

STRAWBERRIES.—For the best four quarts of any variety, Marshall F. Ewell, Marshall	$20 00
Second, George F. Wheeler, Leader	16 00
Third, George V. Fletcher, Bubach	12 00

Special Prizes Offered by the Society.

For the best two quarts of any variety, to be judged by points, Marshall F. Ewell, Marshall	6 00
Second, Isaac E. Coburn, Jessie	5 00
Third, George V. Fletcher, Jessie	4 00
Fourth, Hon. Joseph S. Fay, Parry	3 00
For the best ten baskets, of two quarts each, and not less than three varieties, Isaac E. Coburn	15 00
Second, George V. Fletcher	12 00
Third, George F. Wheeler	10 00
Five baskets, two quarts each, of one variety, Marshall F. Ewell, Marshall	8 00
Second, William Doran & Son, Sharpless	6 00
Third, George F. Wheeler, Leader	5 00
Two quarts of Belmont, George V. Fletcher	4 00
Second, William Doran & Son	3 00
Third, George F. Wheeler	2 00
Bubach, Isaac E. Coburn	4 00
Second, George V. Fletcher	3 00
Third, John L. Gardner	2 00
Champion, George V. Fletcher	4 00
Second, George F. Wheeler	3 00
Third, Wilfred Wheeler	2 00

Charles Downing, William Doran & Son	$4 00
Second, George F. Wheeler	3 00
Third, Nathaniel T. Kidder	2 00
Crescent, Isaac E. Coburn	4 00
Second, George F. Wheeler	3 00
Cumberland, William Patterson	4 00
Second, Wilfred Wheeler	3 00
Third, George F. Wheeler	2 00
Jessie, George V. Fletcher	4 00
Second, Isaac E. Coburn	3 00
Third, Elisha S. Converse	2 00
Jewell, George V. Fletcher	4 00
Second, Mrs. Mary T. Goddard	3 00
Leader, George F. Wheeler	4 00
Miner's Prolific, George F. Wheeler	4 00
Sharpless, William Doran & Son	4 00
Second, Hon. Joseph S. Fay	3 00
Third, Charles E. Grant	2 00
Wilder, William G. Prescott,	4 00
Any other variety, Marshall F. Ewell, Marshall	4 00
Second, Bela F. Lincoln, Hersey Columbia	3 00
Third, Isaac E. Coburn, Haverland	2 00
Collection of not less than six varieties, one quart each, George V. Fletcher,	8 00
Second, George F. Wheeler	6 00
One quart of any new variety, not previously exhibited, Bela F. Lincoln, Hersey Columbia	3 00
Second, Samuel H. Warren, Weston	2 00
CHERRIES.— Two quarts of any variety, Oliver R. Robbins	2 00
FOREIGN GRAPES.— Two bunches of any variety, Elisha S. Converse, Black Hamburg	6 00
Second, Winter Brothers, Muscat of Alexandria	4 00
PEACHES.— Six specimens of any variety, Winter Brothers, Waterloo	3 00
Second, Winter Brothers, Amsden	2 00
Gratuities: —	
Benjamin P. Ware, Apples	1 00
Edwin A. Hall, Pears	1 00

JULY 1.

STRAWBERRIES.— One quart of any variety, Marshall F. Ewell, Marshall	3 00
Second, Hon. Joseph S. Fay, Belmont	2 00
Third, George V. Fletcher, Jessie	1 00

CHERRIES.— Black Tartarian, Leverett M. Chase	$3 00
Second, George V. Fletcher	2 00
Third, Edwin Hastings	1 00
Coe's Transparent, Leverett M. Chase	3 00
Any other variety, Winter Brothers, Gov. Wood	3 00
Second, Marshall W. Chadbourne, White Heart	2 00

Gratuities : —

Winter Brothers, Hamburg Grapes and Strawberries	2 00

James G. Allen, Yarmouth, Nova Scotia, Seedling Strawberries, Honorable Mention.

JULY 8.

CHERRIES.— Two quarts of any variety, George S. Curtis, Black Tartarian	3 00
Second, Marshall W. Chadbourne, Downer	2 00
Third, John L. Bird, Coe's Transparent	1 00
RASPBERRIES.— Two quarts of any variety, William Doran & Son, Highland Hardy	3 00
Second, Charles E. Grant, Cuthbert	2 00
CURRANTS.— Two quarts of any red variety, William Doran & Son, Versaillaise	4 00
Second, Benjamin G. Smith, Fay	3 00
Third, Sumner Coolidge, Fay	2 00
Two quarts of any white variety, Benjamin G. Smith, French Transparent	3 00
Second, Benjamin G. Smith, White Gondouin	2 00

Gratuity : —

Winter Brothers, Foreign Grapes	1 00

JULY 15.

RASPBERRIES.— Collection of not less than four varieties, two quarts each, William Doran & Son	4 00
Two quarts of any variety, William Doran & Son, Hornet	3 00
Second, Benjamin G. Smith, Franconia	2 00
CURRANTS.— One quart of Versaillaise, William Doran & Son	2 00
Second, Benjamin G. Smith	1 00
One quart of any other red variety, Benjamin G. Smith, Fay	2 00
Second, Francis Brown Hayes, Fay	1 00
One quart of any white variety, Elisha S. Converse, White Grape	2 00
Second, Benjamin G. Smith, Dana's Transparent	1 00
GOOSEBERRIES.— Two quarts of any Native variety, Joseph S. Chase, Triumph	3 00
Second, Dr. Walter G. Kendall, Downing	2 00
Third, Elisha S. Converse, Downing	1 00

Gratuities: —

Amos Bates, Seedling Gooseberries, Silver Medal.
Elisha S. Converse, Foreign Grapes $1 00
Charles N. Brackett, Cherries 1 00
Charles S. Smith, " 1 00
George S. Curtis, " 1 00

JULY 22.

RASPBERRIES.— Two quarts of any variety, Mrs. E. J. Cutter, Cuthbert 3 00
Second, Charles E. Grant, Cuthbert 2 00
Third, Benjamin G. Smith, Franconia 1 00
CURRANTS.— One quart of any Red variety, Elisha S. Converse, Fay 3 00
Second, Benjamin G. Smith, Versaillaise 2 00
Third, Benjamin G. Smith, Fay 1 00
One quart of any White variety, Benjamin G. Smith, Dana's Transparent 2 00
Second, Elisha S. Converse, White Grape 1 00
BLACKBERRIES.— Two quarts of any variety, Dr. Walter G. Kendall, Lucretia 3 00
GOOSEBERRIES.— Two quarts of any Foreign variety, Winter Brothers, Crown Bob 3 00
Second, William G. Prescott, Industry 2 00
Third, George S. Harwood, " 1 00

Gratuities: —

Charles N. Brackett, Cherries 1 00
Winter Brothers, Grapes 1 00

JULY 29.

BLACKBERRIES.— Two quarts of any variety, Dr. Walter G. Kendall, Lucretia 3 00
Second, Marshall W. Chadbourne, Dorchester 2 00
Third, William C. Eustis, " 1 00
APPLES.— Tetofsky, Samuel Hartwell 3 00
Second, Marshall W. Chadbourne 2 00
PEARS.— Summer Doyenne, Charles N. Brackett 3 00
Second, Benjamin G. Smith 2 00
Third, Leverett M. Chase 1 00
Any other variety, Charles N. Brackett, Giffard 3 00
Second, Rev. Calvin Terry, Madeleine 2 00
Third, Marshall W. Chadbourne, Osband's Summer . . . 1 00
PEACHES.— Any variety, Charles S. Smith, Alexander . . . 3 00
Second, E. J. Cutter, Page's Seedling 2 00

Gratuities: —

Winter Brothers, Collection 2 00
Peter Fisher, Foreign Grapes 2 00

AUGUST 5.

APPLES.— Red Astrachan, the second prize to Samuel Hartwell	$2 00
Third, Winter Brothers	1 00
Sweet Bough, George V. Fletcher	3 00
Second, Warren Heustis & Son	2 00
Third, Samuel Hartwell	1 00
Any other variety, Charles F. Curtis, Williams	3 00
Second, Charles N. Brackett, Early Margaret	2 00
Third, Varnum Frost, Tetofsky	1 00
PEARS.— Giffard, Rufus T. Tobey	3 00
Second, Charles N. Brackett	2 00
Third, Warren Fenno	1 00
Any other variety, Charles N. Brackett, Bloodgood	3 00
Second, Elisha S. Converse, Bloodgood	2 00
Third, Charles N. Brackett, Jargonelle	1 00
BLACKBERRIES.—Two quarts of any variety, Dr. Walter G. Kendall, Lucretia	3 00
Second, E. W. Wood, Kittatinny	2 00
Third, Marshall W. Chadbourne, Dorchester	1 00
PEACHES.— Any variety, J. W. Page, Page's Seedling	3 00
Second, William G. Prescott, Early Canada	2 00
Third, Winter Brothers, Waterloo	1 00
Gratuity : —	
Andrew Wellington, Apricots	1 00

AUGUST 12.

APPLES.— Oldenburg, William T. Hall	3 00
Any other variety, Samuel Hartwell, Williams	3 00
Second, Marshall W. Chadbourne, "	2 00
Third, Varnum Frost, "	1 00
PEARS.— Clapp's Favorite, Charles N. Brackett	3 00
Second, Marshall W. Chadbourne	2 00
Third, Warren Fenno	1 00
Manning's Elizabeth, Mrs. Mary Langmaid	2 00
Second, Frank Ware	1 00
Any other variety, Charles N. Brackett, Giffard	2 00
Second, Warren Fenno, Giffard	1 00
APRICOTS.— Any variety, Andrew Wellington	3 00
Second, Charles E. Grant	2 00
Third, Benjamin G. Smith	1 00
PEACHES.— Any variety, Winter Brothers, Waterloo	3 00
Second, William H. Slocum, Page's Seedling	2 00
Third, Nathan D. Harrington, Seedling	1 00
FOREIGN GRAPES.— Any variety, George A. Nickerson, Black Hamburg	5 00
Second, Elisha S. Converse, Black Hamburg	4 00

AUGUST 19.

APPLES.— Chenango, Charles F. Curtis	$3 00
Second, Samuel Hartwell	2 00
Williams, Varnum Frost	3 00
Second, Walter Russell	2 00
Third, Charles F. Curtis	1 00
Any other variety, Samuel Hartwell, Summer Pippin	3 00
Second, Samuel Hartwell, Gravenstein	2 00
Third, William T. Hall, Oldenburg	1 00
PEARS.— Rostiezer, Elisha S. Converse	3 00
Second, Marshall W. Chadbourne	2 00
Third, Charles N. Brackett	1 00
Tyson, Aaron S. McIntosh	3 00
Second, E. J. Hewins	2 00
Third, John L. Bird	1 00
Any other variety, E. W. Wood, Clapp's Favorite	3 00
Second, Marshall W. Chadbourne, Clapp's Favorite	2 00
Third, Elisha S. Converse, " "	1 00
PEACHES.— Any variety, Nathan D. Harrington, Seedling	3 00
Second, Winter Brothers, Waterloo	2 00
Third, " " Amsden	1 00
PLUMS.— Any variety, Joseph S. Chase, Botan	3 00
Second, Rufus T. Tobey, Bradshaw	2 00
Third, George V. Fletcher, "	1 00

AUGUST 26.

APPLES.— Foundling, Asa Clement	3 00
Second, Samuel Hartwell	2 00
Third, Warren Fenno	1 00
Gravenstein, Samuel Hartwell	3 00
Second, C. H. Handley	2 00
Third, George Sanderson	1 00
Maiden's Blush, Warren Fenno	3 00
Second, Dr. Walter G. Kendall	2 00
Third, Winter Brothers	1 00
Porter, Cephas H. Brackett	3 00
Second, Marshall W. Chadbourne	2 00
Third, C. H. Handley	1 00
Summer Pippin, Warren Fenno	3 00
Second, Samuel Hartwell	2 00
Any other variety, Varnum Frost, Williams	3 00
Second, Walter Russell, "	2 00
Third, Asa Clement, "	1 00
PEARS.— Andrews, Mrs. Mary Langmaid	3 00
Second, Warren Fenno	2 00
Third, Benjamin G. Smith	1 00

Bartlett, Varnum Frost	$3 00
Second, Mrs. Mary Langmaid	2 00
Third, Leonard W. Weston	1 00
Boussock, John L. Bird	3 00
Second, Warren Fenno	2 00
Third, Mrs. Mary Langmaid	1 00
Any other variety, Aaron S. McIntosh, Tyson	3 00
Second, E. J. Hewins, Tyson	2 00
Third, Elisha S. Converse, Clapp's Favorite	1 00
PEACHES.— Collection, Winter Brothers	4 00
Single dish of any variety, the second prize to Winter Brothers, Hale's Early	2 00
Third, Nathan D. Harrington, Seedling	1 00
PLUMS.— Bradshaw, George V. Fletcher	2 00
Second, Rufus T. Tobey	1 00
Imperial Gage, George V. Fletcher	2 00
Second, Charles E. Grant	1 00
Washington, Mrs. Mary T. Goddard	2 00
Any other variety, Joseph S. Chase, Botan	2 00
Second, Winter Brothers, Smith's Orleans	1 00

SEPTEMBER 6.

Gratuities : —

George McWilliam, Collection of Foreign Grapes, the Appleton Gold Medal.

Charles H. Hovey, East Pasadena, Cal., Collection of Oranges and Lemons, the Society's Bronze Medal.

SEPTEMBER 9.

Gratuity: —

Nathan D. Harrington, Seedling Peaches	1 00

SEPTEMBER 16.

APPLES.—Foundling, Asa Clement	3 00
Gravenstein, Artemas Frost	3 00
Second, Samuel Hartwell	2 00
Third, William T. Hall	1 00
Maiden's Blush, Warren Fenno	3 00
Second, Dr. Walter G. Kendall	2 00
Porter, William Patterson	3 00
Second, Charles S. Smith	2 00
Third, John Parker	1 00
Pumpkin Sweet, Mrs. J. S. Whiting	3 00
Second, Samuel Hartwell	2 00
Any other variety, Warren Fenno, Washington Strawberry	3 00
Second, Warren Fenno, Summer Pippin	2 00
Third, Samuel Hartwell, Holden	1 00

Crab Apples.— Transcendent, Nathan D. Harrington	$2 00
Second, Warren Fenno	1 00
Any other variety, Marshall W. Chadbourne, Hyslop	2 00
Second, E. C. Stone, Russian	1 00
Pears.— Bartlett, A. T. Brown	3 00
Second, William Milman	2 00
Third, Varnum Frost	1 00
Belle Lucrative, Elisha S. Converse	3 00
Second, Clifford R. Weld	2 00
Third, George W. Hall	1 00
Boussock, Charles N. Brackett	3 00
Second, Charles F. Curtis	2 00
Third, John L. Bird	1 00
Hardy, J. J. Oakes	3 00
Second, William Milman	2 00
Third, Charles F. Curtis	1 00
Paradise of Autumn, Leverett M. Chase	3 00
Second, William Milman	2 00
Third, William H. Hunt	1 00
Souvenir du Congrès, Peter W. Pierce	3 00
Second, Dr. Walter G. Kendall	2 00
Third, Warren Fenno	1 00
Any other variety, Nathan D. Harrington, Sheldon	3 00
Second, Thomas M. Davis, Louise Bonne of Jersey	2 00
Third, Elisha S. Converse, Golden Beurre,	1 00
Peaches.— Crawford's Early, J. L. Duncan	3 00
Second, Mrs. Fannie E. Gay	2 00
Third, Mrs. Mary Langmaid	1 00
Foster, John L. Bird	3 00
Second, Nathan D. Harrington	2 00
Third, Samuel Hartwell	1 00
Oldmixon, Leverett M. Chase	3 00
Second, F. J. Kinney	2 00
Third, Charles S. Smith	1 00
Stump the World, Charles E. Grant	3 00
Second, Nathan D. Harrington	2 00
Third, F. J. Kinney	1 00
Any other variety, G. T. Raymond, Seedling	3 00
Second, Nathan D. Harrington, "	2 00
Third, Jackson Dawson, "	1 00
Peaches, Orchard House Culture.— Joseph H. White	4 00
Nectarines.— C. C. Donnell	2 00
Second, Warren Fenno	1 00
Plums.— Bradshaw, George V. Fletcher	2 00
Second, F. J. Kinney	1 00
Imperial Gage, George V. Fletcher	2 00
Second, Charles E. Grant	1 00

Lombard, George V. Fletcher	$2 00
Second, Leverett M. Chase	1 00
Any other variety, Mrs. Mary T. Goddard, Pond's Seedling	2 00
Second, F. J. Kinney, Gen. Hand	1 00
NATIVE GRAPES. — August Rose, William H. Hunt	3 00
Cottage, Samuel G. Damon	3 00
Second, Samuel Hartwell	2 00
Third, Benjamin G. Smith	1 00
Eumelan, Benjamin G. Smith	3 00
Massasoit, F. J. Kinney	3 00
Second, Benjamin G. Smith	2 00
Moore's Early, Samuel Hartwell	3 00
Second, Samuel G. Damon	2 00
Third, Benjamin G. Smith	1 00
Any other variety, F. J. Kinney, Worden	3 00
Second, Samuel Hartwell, "	2 00
Third, Benjamin G. Smith	1 00
Any variety from girdled vines, F. J. Kinney, Worden	3 00
Second, F. J. Kinney, Concord	2 00
Gratuity : —	
Robert Manning, Brown Turkey Figs	1 00

ANNUAL EXHIBITION OF FRUITS AND VEGETABLES.

OCTOBER 4 AND 5.

Special Prizes, Samuel Appleton Fund.

APPLES.— Baldwin, Marshall W. Chadbourne	5 00
Hubbardston, Artemas Frost	5 00
PEARS.— Bosc, John L. Bird	5 00
Sheldon, Samuel G. Damon	5 00

Benjamin V. French Fund.

APPLES.— Gravenstein, Samuel Hartwell,	5 00
Rhode Island Greening, William O'Connell	5 00

Marshall P. Wilder Fund.

PEARS.— Anjou, A. T. Brown	4 00
Second, William S. Janvrin	3 00
Third, Mrs. Mary Langmaid	2 00
Fourth, Warren Fenno	1 00
Bartlett, Varnum Frost	4 00
Second, A. T. Brown	3 00
Third, Samuel G. Damon	2 00
Fourth, George V. Fletcher	1 00

NATIVE GRAPES.— Concord, George B. Andrews	$3 00
Second, Samuel G. Damon	2 00
Third, F. J. Kinney	1 00
Worden, George B. Andrews	3 00
Second, Samuel Hartwell	2 00
Third, F. J. Kinney	1 00

Theodore Lyman Fund.

FOREIGN GRAPES.—For the heaviest and best ripened bunch of any Black variety, not less than six pounds, Mrs. J. W. Clark	10 00

Special Prizes Offered by the Society.

PEARS.— Anjou, Cephas H. Brackett	5 00
Seckel, Marshall W. Chadbourne	5 00
PEACHES.— Any variety, Samuel Hartwell	5 00
NATIVE GRAPES.— Any variety, George B. Andrews	5 00

REGULAR PRIZES.

Theodore Lyman Fund.

APPLES.— Baldwin, William Patterson	4 00
Second, E. R. Cook	3 00
Third, George V. Fletcher	2 00
Fall Orange, Asa Clement	3 00
Second, Charles S. Smith	2 00
Third, C. H. Handley	1 00
Fameuse, H. Whittaker	3 00
Second, Artemas Frost	2 00
Third, Marshall W. Chadbourne	1 00
Fletcher Russet, John Fletcher	3 00
Second, William H. Teele	2 00
Foundling, Asa Clement	3 00
Gloria Mundi, Mrs. John Clark	3 00
Second, Samuel Hartwell	2 00
Third, E. R. Cook	1 00
Golden Russet, Warren Fenno	2 00
Gravenstein, Samuel Hartwell	4 00
Second, Artemas Frost	3 00
Third, H. Whittaker	2 00
Hubbardston, Marshall W. Chadbourne	4 00
Second, John Parker	3 00
Third, Leonard W. Weston	2 00
Hunt Russet, Samuel Hartwell	3 00
Second, William H. Teele	2 00
Third, A. M. Knowlton	1 00
Lady's Sweet, David L. Fisk	2 00
Second, William H. Teele	1 00

Mackintosh, the second prize to Samuel Hartwell	$2 00
Maiden's Blush, Dr. Walter G. Kendall	2 00
Second, E. R. Cook	1 00
Mother, Asa Clement	3 00
Second, O. B. Hadwen	2 00
Third, Warren Fenno	1 00
Northern Spy, William T. Hall	3 00
Second, Samuel Hartwell	2 00
Third, O. B. Hadwen	1 00
Porter, John C. Hovey	3 00
Second, Samuel G. Damon	2 00
Third, C. M. Handley	1 00
Pound Sweet, George V. Fletcher	3 00
Pumpkin Sweet, Asa Clement	2 00
Second, George W. Stevens	1 00
Rhode Island Greening, Charles N. Brackett	4 00
Second, William O'Connell	3 00
Third, Artemas Frost	2 00
Roxbury Russet, E. R. Cook	4 00
Second, George Sanderson	3 00
Third, George V. Fletcher	2 00
Sutton, David L. Fisk	3 00
Second, O. B. Hadwen	2 00
Tolman Sweet, Artemas Frost	3 00
Second, Asa Clement	2 00
Third, Joshua T. Foster	1 00
Tompkins King, John Fletcher	3 00
Second, Samuel Hartwell	2 00
Third, William C. Eustis	1 00
Washington Royal, Charles N. Brackett	3 00
Second, O. B. Hadwen	2 00
Third, Samuel Hartwell	1 00
Washington Strawberry, Mrs. John S. True	2 00
Second, Warren Fenno	1 00
Any other variety, Edmund Hersey, Brewer	3 00
Second, William Everett, Jacobs Sweet	2 00
Third, Samuel Hartwell, Ben Davis	1 00
CRAB APPLES — Hyslop, G. Blanchard	2 00
Second, Marshall W. Chadbourne	1 00
Any other variety, Benjamin P. Ware	2 00
Second, Nathan D. Harrington, Transcendent	1 00

Society's Prizes.

PEARS.— Angouleme, Samuel G. Damon	4 00
Second, A. T. Brown	3 00
Third, Nathan D. Harrington	2 00

Bosc, Mrs. Mary Langmaid	$4 00
Second, John L. Bird	3 00
Third, Lewis E. R. Smith	2 00
Fourth, A. T. Brown	1 00
Clairgeau, Warren Fenno	3 00
Second, William S. Janvrin	2 00
Third, William T. Hall	1 00
Comice, Charles N. Brackett	3 00
Second, Warren Fenno	2 00
Third, S. F. & F. L. Weston	1 00
Dana's Hovey, George Frost	3 00
Second, Samuel G. Damon	2 00
Third, E. W. Wood	1 00
Diel, Thomas M. Davis	3 00
Second, E. L. Draper	2 00
Third, Benjamin G. Smith	1 00
Fulton, Elisha S. Converse	3 00
Second, S. F. & F. L. Weston	2 00
Third, Hon. James J. H. Gregory	1 00
Hardy, William Milman	3 00
Second, Rufus T. Tobey	2 00
Third, Aaron S. McIntosh	1 00
Howell, Mrs. Mary Langmaid	3 00
Second, Benjamin G. Smith	2 00
Third, Charles N. Brackett	1 00
Josephine of Malines, Warren Fenno	3 00
Second, John L. Bird	2 00
Third, David L. Fiske	1 00
Lawrence, William S. Janvrin	3 00
Second, Warren Fenno	2 00
Third, Thomas M. Davis	1 00
Louise Bonne of Jersey, John W. Martin	3 00
Second, Thomas M. Davis	2 00
Third, Leverett M. Chase	1 00
Marie Louise, Mrs. E. M. Lancaster	3 00
Second, Samuel G. Damon	2 00
Third, Charles E. Swain	1 00
Merriam, Aaron S. McIntosh	3 00
Second, Charles F. Curtis	2 00
Third, E. J. Hewins	1 00
Onondaga, Charles N. Brackett	3 00
Second, Thomas M. Davis	2 00
Third, Leverett M. Chase	1 00
Seckel, Nathan D. Harrington	4 00
Second, William Milman	3 00
Third, H. A. Stevens	2 00

Sheldon, Mrs. Mary Langmaid	$4 00
Second, Samuel G. Damon	3 00
Third, Warren Heustis & Son	2 00
Souvenir du Congrès, A. T. Brown	3 00
Second, G. W. Wilkinson	2 00
Third, Marshall W. Chadbourne	1 00
St. Michael Archangel, W. Heustis & Son	3 00
Second, Thomas M. Davis	2 00
Third, Benjamin G. Smith	1 00
Superfin, Leverett M. Chase	3 00
Second, J. M. W. Ober	2 00
Third, Thomas M. Davis	1 00
Urbaniste, Elisha S. Converse	3 00
Second, John L. Bird	2 00
Third, G. T. Raymond	1 00
Vicar, Mrs. E. M. Lancaster	3 00
Second, Elisha S. Converse	2 00
Third, Charles E. Swain	1 00
Winter Nelis, Thomas M. Davis	3 00
Second, Edwin A. Hall	2 00
Third, Winter Brothers	1 00
Any other variety, A. M. Leavitt, Belle Lucrative	3 00
Second, A. T. Brown, De Tongres	2 00
Third, Elisha S. Converse, Kingsessing	1 00
QUINCES.— Orange, Mrs. Mary T. Goddard	3 00
Second, A. T. Brown	2 00
Third, George V. Fletcher	1 00
Pear, " " "	3 00
Second, Benjamin G. Smith	2 00
Rea, George S. Harwood	3 00
Second, George S. Curtis	2 00
Third, Benjamin G. Smith	1 00
Any other variety, Charles S. Smith	3 00
Second, William S. Janvrin	2 00
Third, Benjamin G. Smith	1 00
PEACHES.— Crawford's Late, Samuel Hartwell	3 00
Second, Mrs. Mary Langmaid	2 00
Third, William H. Hunt	1 00
Any other variety, John L. Bird	3 00
Second, W. D. Hinds	2 00
Third, A. L. Whiton	1 00
PEACHES, ORCHARD HOUSE CULTURE.— Charles E. Grant	4 00
Second, L. L. White	3 00
PLUMS.— Coe's Golden Drop, Charles E. Grant	2 00
Any other variety, George V. Fletcher	2 00
Second, George V. Fletcher	1 00

NATIVE GRAPES.— Six bunches of Brighton, Samuel G. Damon	$3 00
Second, Samuel Hartwell	2 00
Third, Joseph S. Chase	1 00
Delaware, George B. Andrews	3 00
Second, Samuel G. Damon	2 00
Third, E. R. Cook	1 00
Herbert, Joseph S. Chase	3 00
Second, Samuel G. Damon	2 00
Iona, Samuel G. Damon	3 00
Second, Benjamin G. Smith	2 00
Lindley, F. J. Kinney	3 00
Second, Benjamin G. Smith	2 00
Third, Samuel G. Damon	1 00
Niagara, Samuel Hartwell	3 00
Second, Benjamin G. Smith	2 00
Third, P. G. Hanson	1 00
Pocklington, A. C. Osborn	3 00
Second, Samuel Hartwell	2 00
Third, George B. Andrews	1 00
Prentiss, Benjamin G. Smith	3 00
Second, Joseph S. Chase	2 00
Third, Mrs. Mary T. Goddard	1 00
Wilder, Benjamin G. Smith	3 00
Second, Samuel G. Damon	1 00
Third, George B. Andrews	1 00
Worden, " " "	3 00
Second, Benjamin G. Smith	2 00
Third, Samuel Hartwell	1 00
Any other variety, Benjamin G. Smith	3 00
Second, Benjamin G. Smith	2 00
Third, Luther Eames	1 00
Six bunches of Concord, from girdled vines, F. J. Kinney	3 00
FOREIGN GRAPES.—Four varieties, two bunches each, George A. Nickerson	10 00
Fourth prize to Benjamin G. Smith	4 00
Black Hamburg, two bunches, Mrs. J. W. Clark	5 00
Buckland Sweetwater, George A. Nickerson	5 00
Muscat of Alexandria, Joseph H. White	5 00
Wilmot's Hamburg, George A. Nickerson	5 00
Any other variety, Mrs. J. W. Clark	5 00
Second, Joseph H, White	4 00
CRANBERRIES.— Half-peck, L. J. Fosdick	3 00
Second, Edmund Hersey	2 00
Third, Rev. Calvin Terry	1 00
Gratuities:—	
Mrs. Mary T. Goddard, Apples and Pears	2 00
Warren Heustis & Son, Pears	2 00

Mrs. John S. True, Pears and Quinces	$1 00
American Manufacturing Co., Evaporator Exhibit	25 00

OCTOBER 14.

Gratuity :—

Charles H. Hovey, East Pasadena, Cal., Pomegranates	2 00

OCTOBER 28.

Gratuity :—

Nathan D. Harrington, Seckel Pears	1 00

NOVEMBER 18.

Special Prizes, Benjamin V. French Fund.

APPLES.— Baldwin, Samuel J. Trepess	5 00
Hubbardston, Artemas Frost	5 00

Society's Prizes.

Baldwin, William H. McIntosh	3 00
Second, Walter Russell	2 00
Third, Charles S. Smith	1 00
Danvers Sweet, Benjamin P. Ware	3 00
Fletcher Russet, John Fletcher	3 00
Second, William H. Teele	2 00
Hubbardston, Artemas Frost	3 00
Second, Marshall W. Chadbourne	2 00
Third, John Parker	1 00
Hunt Russet, Samuel Hartwell	3 00
Second, Hon. Starkes Whiton	2 00
Third, William H. Teele	1 00
Lady's Sweet, William H. Teele	3 00
Northern Spy, Ida E. Burbank	3 00
Second, Samuel Hartwell	2 00
Third, William T. Hall	1 00
Rhode Island Greening, Artemas Frost	3 00
Second, William O'Connell	2 00
Third, Charles N. Brackett	1 00
Roxbury Russet, Cephas H. Brackett	3 00
Second, Joshua Stowe	2 00
Third, Eustis Baker	1 00
Tolman Sweet, Artemas Frost	3 00
Second, Asa Clement	2 00
Third, Aaron S. McIntosh	1 00
Tompkins King, H. E. Small	3 00
Second, Asa Clement	2 00
Third, William C. Eustis	1 00
Any other variety, Artemas Frost, Gravenstein	3 00
Second, John Parker, Yellow Bellflower	2 00
Third, A. T. Brown, York Imperial	1 00

PEARS.—Angouleme, Samuel G. Damon	$4 00
Second, A. T. Brown	3 00
Anjou, A. T. Brown	4 00
Second, William Milman	3 00
Third, George V. Fletcher	2 00
Fourth, J. M. Swett	1 00
Clairgeau, William T. Hall	3 00
Second, Warren Fenno	2 00
Third, Samuel G. Damon	1 00
Comice, Warren Fenno	4 00
Second, Marshall W. Chadbourne	3 00
Dana's Hovey, Samuel G. Damon	4 00
Second, Edwin A. Hall	3 00
Third, Warren Fenno	2 00
Fourth, A. H. Lewis	1 00
Diel, Edwin A. Hall	3 00
Second, A. T. Brown	2 00
Third, Samuel G. Damon	1 00
Glout Morceau, Mrs. G. A. Curtis	3 00
Second, Edwin A. Hall	2 00
Third, A. H. Lewis	1 00
Josephine of Malines, Warren Fenno	3 00
Second, John L. Bird	2 00
Third, Samuel G. Damon	1 00
Langelier, A. T. Brown	3 00
Second, A. H. Lewis	2 00
Third, Aaron S. McIntosh	1 00
Lawrence, Samuel G. Damon	3 00
Second, Warren Fenno	2 00
Third, Leverett M. Chase	1 00
Vicar, Elisha S. Converse	3 00
Second, William H. McIntosh	2 00
Third, Charles E. Swain	3 00
Winter Nelis, Edwin A. Hall	3 00
Second, A. T. Brown	2 00
Any other variety, William Milman, Mount Vernon	3 00
Second, Samuel G. Damon, Sheldon	2 00
Third, S. F. & F. L. Weston, Columbia	1 00
FOREIGN GRAPES.—Two bunches of any variety, George A. Nickerson, Alicante	5 00
Second, George A. Nickerson, Lady Downes	4 00
Third, Joseph H. White, Alicante	3 00

Gratuities:

Thomas M. Davis, Collection of Pears	5 00
L. J. Fosdick, Cranberries	3 00
P. G. Hanson, "	2 00

APPLETON GOLD MEDAL.

Annual Exhibition of Plants and Flowers, September 6, 7. George McWilliam, Collection of Foreign Grapes.

SOCIETY'S SILVER MEDAL.

July 15. Amos Bates, Bates Gooseberries, a new Seedling.

SOCIETY'S BRONZE MEDAL.

Annual Exhibition of Plants and Flowers, September 6, 7. Charles H. Hovey, East Pasadena, Cal., Collection of Oranges and Lemons.

FIRST CLASS CERTIFICATE OF MERIT.

January 7. F. H. Frazier, Danville, Indiana, Arnold Pears.

HONORABLE MENTION.

February 4. Ellwanger & Barry, Rochester, N. Y., New Winter Pears.
July 1. James G. Allen, Yarmouth, Nova Scotia, Seedling Strawberries.

REPORT

OF THE

COMMITTEE ON VEGETABLES,

FOR THE YEAR 1893.

By CHARLES N. BRACKETT, CHAIRMAN.

The exhibitions in this department the past year were more or less affected by the lateness of the season. This was especially the case for a few weeks during the earlier part of the summer, contributors finding it difficult to meet the requirements of the Schedule, with a season from ten days to two weeks behind the average.

This was in a great measure overcome, however, as the season advanced, and there was a corresponding improvement in our weekly exhibitions, which continued until the close of the season. In the arrangement of the Schedule, it is the aim of the Committee for Establishing Prizes to fix the dates for our shows to correspond with average seasons as nearly as possible. If a season is a week or ten days later than the average, which occasionally occurs, our exhibitions during the earlier part of such a season, and before warm, settled weather sets in, are sure to be more or less affected, as witnessed the past year.

There has been a noticeable improvement in our shows of Forced Vegetables during the months of January and February, both in the quantity and variety of specimens shown as compared with the previous year. Nearly all the prizes offered were competed for.

The show of vegetables at the May exhibition on the 6th of the month, brought out a fine display of the different varieties usually

seen at that season, most of which, however, were grown under glass. Although it was prize day for Asparagus, none was shown for premium until the Rhododendron Show, June 6. Last year the first Asparagus was exhibited May 10, and all the prizes were awarded. This leaves a wide margin between the two seasons as regards earliness, and accounts for the lack of exhibits on prize days earlier in the season.

At the Rose and Strawberry Show the display of vegetables was remarkably full and fine, all but two third prizes being awarded. An interesting feature of this exhibition, and one which attracted particular attention from the visiting public, was the large and well-grown collection of Lettuce, made by M. H. Walsh, gardener to Hon. Joseph S. Fay, consisting of eighteen named varieties. This exhibit afforded a favorable opportunity, such as is seldom offered, for comparing the different varieties, which those interested were quick to appreciate. The Appleton Silver Medal was awarded Mr. Fay for this fine display, and superior cultivation of lettuce.

The weekly exhibitions during the season, commencing on the first Saturday in July, have been good, and very few inferior specimens have been seen on our tables.

Owing to the lateness of the season, such vegetables as require a good degree of heat in order to bring them to maturity were in most instances found to be behind the requirements of the Schedule. Melons, Tomatoes, Egg Plants, Lima Beans, Sweet Corn, etc., were among the kinds which passed the first, and sometimes the second prize day, without a single specimen being shown. It was an unusually poor season for the Melon crop, and considerable complaint was also made by the growers, of great injury done to the vines by the black flea, or louse, and the rust. The first exhibit of Greenflesh Melons was made August 19, when Isaac E. Coburn showed some fine specimens. He was the only competitor, and the only person who showed Melons during the month.

The exhibition on September 16, was one of the largest and best of all the weekly shows. The various crops, which on account of the lateness of the season had previously lagged behind, seemed to have made up for lost time and to have fully caught up with the season and the Schedule. The quantity, quality, and variety of the specimens shown excited the admiration of visitors, and was

an agreeable surprise to your Committee. The specimen Melons, Cauliflowers, Celery, Tomatoes, Egg Plants, and Lima Beans, were excellent, showing both care and skill in cultivation, and would compare favorably with any former exhibition. Hon. Joseph S. Fay's collection of melons contained some fine specimens and attracted considerable attention, as did also Hon. Aaron Low's twenty-four well-grown varieties of tomatoes.

Judging from specimens shown, the past season must have been remarkably favorable for the growth of the Cauliflower. Finer flowers than those shown by William H. Teele and A. M. Knowlton, both at this and the Annual Exhibition, are rarely seen. These gentlemen have for several years taken the lead at our exhibitions as successful cultivators of this popular vegetable. They have, it is true, set the standard high; nevertheless it is hoped it will not discourage other growers from endeavoring to attain to, or even surpass it. There is still "room at the top."

On July 29, a new tomato was shown by Samuel J. Trepess, under the name of May's Favorite, which struck your Committee very favorably on account of the many points of excellence which it appeared to possess, aside from the uniformity and beauty of individual specimens. They were grown on the trellis system—without doubt the best manner of growing the finest and most perfect fruit. This method of culture may in a measure account for the unusual excellence of the specimens shown as compared with those of common field culture. For the amateur, or for the kitchen garden, when only a limited number of plants are required and space is an object, the trellis system has its advantages and can be recommended. It furnishes the most perfect fruit, requires less room, and places each fruit where it receives the full benefit of sun and air and is easily seen and gathered when required. The market gardener who grows by the acre could not with profit adopt this system on account of the expense attending it.

At the Annual Exhibition the Lower Hall was completely filled with the display of vegetables alone, forming the largest, and we think the best, exhibit this department has ever made.

The show of Celery, both for the Special and Regular prizes, was of a high order of merit, Warren Heustis & Son taking the first prize in both classes. The other principal exhibitors were Varnum Frost and H. R. Kinney. Appearance goes a great way in vegetables as well as fruits. The finest appearing of all

Celeries, the Golden Self Blanching and White Plume, are we think, the poorest in quality. When compared with the old Boston Market, they are not only tough and stringy, but lack the flavor and crispness characteristic of that famous old variety.

The potato exhibit at the Annual Exhibition was considerably larger in quantity than that of last year, and we think there was also an improvement in the quality of the specimens shown. The season seems to have favored the crop, which was of excellent quality and in this vicinity quite free from disease.

At the weekly shows Hon. Joseph S. Fay again took the lead and the prizes, and also was awarded the first premium for the best four varieties at the Annual Show. There has been a noticeable improvement within the past few years in the character of specimens offered for competition, which is quite encouraging, and that is the absence of coarse, overgrown, and sometimes unwashed specimens, which have occasionally in former years, been placed on exhibition, and which for the credit of our Society the Committee have felt called upon in the way of their duty, to remove and place under the table.

At the closing exhibition, November 18, this department was well represented and made a full and interesting display of the varied products of the season. Most of the premiums were competed for and awarded. Aside from the prize list, quite large miscellaneous collections were shown by H. R. Kinney, Walter Russell, Warren Heustis & Son, and Dr. Walter G. Kendall.

This brings us to the close of our exhibition season. And now we have harvested the hopes of a year ago and are thankful for the measure of plenty with which we are surrounded, let us plan for another seedtime and harvest, hoping to avoid past errors, to increase thrift, improve our exhibitions in all possible ways, and have a better balance sheet to show for the coming year than we now have for the past.

The annual appropriation for Vegetables was $1,100. Of this amount, the Committee have awarded in prizes and gratuities $1,044, leaving an unexpended balance of $56.

Respectfully submitted,

For the Committee,

C. N. BRACKETT,

Chairman.

PRIZES AND GRATUITIES AWARDED FOR VEGETABLES.

January 7.

Radishes.— Four bunches, the third prize to John L. Bird	$1 00
Cucumbers.— Pair of any variety, Nathaniel T. Kidder	3 00
Second, John L. Gardner, Sion House	2 00
Third, " " "	1 00
Cauliflowers.— Four, William H. Teele	3 00
Second, Nathaniel T. Kidder	2 00
Lettuce.— Four heads, John L. Bird	3 00
Parsley.— Two quarts, George F. Stone	3 00
Second, F. J. Kinney	2 00
Third, H. A. Stearns	1 00
Mushrooms.— Twenty-four specimens, William Stobbart	3 00
Second, J. C. Rogers	2 00
Tomatoes.— Twelve specimens, Winter Brothers, Essex	3 00
Second, Winter Brothers, Lorillard	2 00
Third, William Stobbart	1 00
Gratuities : —	
Warren Heustis & Son, Celery	1 00
" " " " Dandelions	1 00

February 4.

Radishes.— Four bunches, George F. Stone	3 00
Cucumbers.— Pair, John L. Gardner	3 00
Dandelions.— Peck, Warren Heustis & Son	3 00
Mushrooms.— Twenty-four specimens, George E. Sanderson	3 00
Second, Isaac E. Coburn	2 00
Third, William Patterson	1 00
Rhubarb.— Twelve stalks, George Sanderson	3 00
Second, Elmer E. Sanderson	2 00
Tomatoes.— Twelve, Winter Brothers	3 00
Second, George M. Hay	2 00
Third, Elisha S. Converse	1 00
Gratuities : —	
Warren Heustis & Son, Parsley	1 00
George F. Stone, "	1 00
John L. Gardner, Celery and Cauliflowers	3 00
William Stobbart, Collection	2 00

MARCH 4.

Gratuities : —

George B. Gill, Mushrooms	$1 00
George F. Stone, Collection	2 00

SPRING EXHIBITION.

MARCH 21, 22, 23, AND 24.

William J. Walker Fund.

RADISHES.— Four bunches Turnip Rooted, George F. Stone	3 00
Second, Walter Russell, French Breakfast	2 00
Third, " " White Box	1 00
Four bunches of Long Scarlet, H. R. Kinney	3 00
CELERY.— Four roots, John L. Gardner	3 00
Second, Nathaniel T. Kidder	2 00
DANDELIONS.— Peck, Warren Heustis & Son	3 00
Second, Walter Russell	2 00
LETTUCE.— Four heads, George F. Stone	3 00
Second, H. R. Kinney	2 00
Third, John L. Gardner	1 00
WATER CRESSES.— Two quarts, Nathaniel T. Kidder	2 00
PARSLEY.— Two quarts, H. R. Kinney	2 00
Second, George F. Stone	1 00
RHUBARB.— Twelve stalks, George Sanderson	3 00
Second, Elmer E. Sanderson	2 00
TOMATOES.— Twelve, Elisha S. Converse	3 00
Second, Winter Brothers, Nicholson's Hybrid	2 00
Third, " " Essex	1 00

Gratuities : —

John L. Gardner, Cucumbers	2 00
Rev. Calvin Terry, Onions	1 00
Dr. Walter G. Kendall, Brussels Sprouts	1 00
Warren Heustis & Son, Collection	1 00

APRIL 1.

MUSHROOMS.— Twenty-four, Isaac E. Coburn	3 00

Gratuity : —

Walter Russell, Lettuce and Radishes	2 00

MAY EXHIBITION.

MAY 6.

William J. Walker Fund.

CUCUMBERS.— Pair, Warren Heustis & Son	3 00
Second, Walter Russell	2 00
Third, John L. Gardner	1 00

Spinach.— Peck, Warren Heustis & Son	$3 00
Dandelions.— Peck, Warren Heustis & Son	2 00
Second, Walter Russell	1 00
Lettuce.— Four heads, Walter Russell	3 00
Second, George F. Stone	2 00
Third, John L. Gardner	1 00

Gratuities : —

Winter Brothers, three varieties of Tomatoes	2 00
William Nicholson, Tomatoes	1 00
Walter Russell, Radishes	1 00
George F. Stone, Radishes and Parsley	1 00
Francis Brown Hayes, Mushrooms	1 00

May 13.

Gratuities : —

Francis Brown Hayes, Mushrooms	1 00
Charles E. Grant, Asparagus	1 00

May 27.

Gratuities : —

Charles E. Grant, Asparagus	1 00
Sidney Lawrence, Rhubarb	1 00

June 3.

Gratuities : —

Walter Russell, Radishes	1 00
Leonard W. Weston, Asparagus	1 00
Hon. George Heywood, "	1 00

RHODODENDRON SHOW.

June 6 and 7.

Carrots.— Twelve Short Scarlet, Nathaniel T. Kidder	3 00
Radishes.— Four bunches of Turnip Rooted, Walter Russell	3 00
Long Scarlet, Walter Russell	3 00
Asparagus.— Four bunches, C. W. Prescott	3 00
Second, William H. Hunt	2 00
Third, Leonard W. Weston	1 00
Cucumbers.— Pair, Warren Heustis & Son	3 00
Second, Walter Russell	2 00
Lettuce.— Four heads, Hon. Joseph S. Fay, Deacon	3 00
Second, Warren Heustis & Son, Boston Curled	2 00
Third, " " " " Tennisball	1 00
Rhubarb.— Twelve stalks, Samuel Trepess	3 00
Second, Francis Brown Hayes, Seedling	2 00
Third, " " " Victoria	1 00
Tomatoes.—Twelve, Winter Brothers, Nicholson's Hybrid	3 00
Second, Winter Brothers, Essex	2 00
Third, " " Chemin	1 00

Gratuities : —

Walter Russell, Onions and Spinach	$2 00
Hon. Joseph S. Fay, Cauliflowers	2 00
" " " " Lettuce	1 00
Warren Heustis & Son, Collection	2 00

JUNE 10.

Gratuity : —

Benjamin G. Smith, Rhubarb (16 lbs. 14 ozs.)	1 00

ROSE AND STRAWBERRY EXHIBITION.

JUNE 20 AND 21.

BEETS.— Twelve Summer Turnip Rooted, Warren Heustis & Son	3 00
Second, Crosby Brothers	2 00
Third, Mrs. Mary T. Goddard	1 00
ONIONS.— Twelve, Walter Russell, Portugal	3 00
Second, Warren Heustis & Son	2 00
Third, Walter Russell, Danvers	1 00
CUCUMBERS.— Pair of White Spine, Warren Heustis & Son	3 00
Second, Walter Russell	2 00
CABBAGES.— Three, Mrs. Mary T. Goddard	3 00
Second, Walter Russell	2 00
LETTUCE.— Four heads, Hon. Joseph S. Fay	3 00
Second, George F. Stone	2 00
Third, Walter Russell	1 00
PEAS.— Half-peck, Cephas H. Brackett	3 00
Second, Mrs. Mary T. Goddard	2 00
Third, Charles E. Grant	1 00

Gratuities : —

Peter Fisher & Co., Collection of Tomatoes	2 00
Winter Brothers, Tomatoes	1 00
Mrs. Mary T. Goddard, Rhubarb	1 00
George Sanderson, "	1 00
Warren Heustis & Son, Collection	3 00
Walter Russell, "	3 00

Hon. Joseph S. Fay, Collection of eighteen varieties of Lettuce, Appleton Silver Medal.

EXHIBITIONS THROUGH THE SEASON.

JULY 1.

POTATOES. — Twelve specimens, Hon. Joseph S. Fay, Hebron	3 00
Second, Hon. Joseph S. Fay, Early Rose	2 00
Third, " " " " Queen	1 00

Onions.— Twelve specimens, Walter Russell	$2 00
Second, Hon. Joseph S. Fay	1 00
Squashes.— Long Warted, Warren Heustis & Son	2 00
Cabbages.— Three, Walter Russell	3 00
Second, Hon. Joseph S. Fay, Wakefield	2 00
Third, " " " " Empress	1 00
Peas.—Half-peck of American Wonder, Hon. Joseph S. Fay	3 00
Second, Charles E. Grant	2 00

Gratuities : —

Nathaniel T. Kidder, Beans	1 00
Warren Heustis & Son, Collection	3 00
Walter Russell, "	3 00
Hon. Joseph S. Fay, "	2 00

July 8.

Potatoes.— Twelve specimens, Hon. Joseph S. Fay, Hebron	3 00
Second, Hon. Joseph S. Fay, Queen	2 00
Third, " " " " Rose	1 00
Squashes.— Four Long Warted, Walter Russell	2 00
Second, Warren Heustis & Son	1 00
Beans.— Half-peck of String, Sumner Coolidge	3 00
Second, Warren Heustis & Son	2 00
Peas.— Half-peck of Stratagem, Walter Russell	3 00
Any other variety, Charles E. Grant, Shropshire Hero	3 00
Second, Hon. Joseph S. Fay, Advancer	2 00
Third, " " " " American Wonder	1 00

Gratuities : —

Dr. Walter G. Kendall, Lettuce	1 00
William Doran & Son, Collection of Lettuce	1 00
Winter Brothers, Tomatoes	1 00
Walter Russell, Collection	3 00
Warren Heustis & Son, Collection	2 00

July 15.

Levi Whitcomb Fund.

Cabbages.— Three, Walter Russell	3 00
Beans.— Half-peck of Cranberry, Sumner Coolidge	3 00
Second, Isaac E. Coburn	2 00
Peas.— Half-peck, Charles E. Grant	3 00
Second, Isaac E. Coburn	2 00
Third, Rev. Calvin Terry	1 00

Gratuity : —

Walter Russell, Collection	4 00

JULY 22.

POTATOES.— Twelve specimens, Hon. Joseph S. Fay, Hebron	$3 00
Second, Hon. Joseph S. Fay, Savoy	2 00
Third, " " " " Queen	1 00
LETTUCE.— Four heads, Walter Russell	3 00
Second, Warren Heustis & Son	2 00
Third, William Doran & Son	1 00
SWEET CORN.— Twelve ears, Sumner Coolidge	3 00
Third, Charles E. Grant	1 00
TOMATOES.— Open culture, twelve specimens, Varnum Frost, Emery	3 00
Second, Varnum Frost, Comrade	2 00
Third, Sumner Coolidge, Emery	1 00
Gratuities : —	
Charles N. Brackett, Telephone Peas	1 00
Rev. Calvin Terry, Advancer "	1 00
Nathaniel T. Kidder, Stratagem "	1 00
Charles E. Grant, Peas and Beans	1 00
Nathaniel T. Kidder, Tomatoes	1 00
E. W. Wood, "	1 00
Warren Heustis & Son, Collection	3 00
Walter Russell, "	3 00
Winter Brothers, "	2 00
Isaac E. Coburn, "	2 00
Dr. Walter G. Kendall, "	1 00

JULY 29.

POTATOES.—Twelve specimens, Hon. Joseph S. Fay, Hebron	3 00
Second, Hon. Joseph S. Fay, Savoy	2 00
Third, " " " " Rose	1 00
PEAS.— Half-peck, Sidney Lawrence, Stratagem	3 00
Second, H. R. Kinney, Stratagem	2 00
Third, Samuel J. Trepess	1 00
SWEET CORN.— Twelve ears of Crosby, F. J. Kinney	3 00
Any other variety, F. J. Kinney, Farquhar's First Crop	3 00
Second, Charles E. Grant, Corey	2 00
Third, " " " Burbank	1 00
TOMATOES.—Twelve specimens, Samuel J. Trepess, May's Favorite	3 00
Second, Varnum Frost, Comrade	2 00
Third, Isaac E. Coburn, Chenery	1 00
Gratuities :—	
Nathaniel T. Kidder, Duke of Albany Peas, and Corn	2 00
Charles N. Brackett, Peas	1 00
John Parker, Collection of Beans	2 00
Charles E. Grant, Beans	1 00
Samuel J. Trepess, Squashes	1 00
Charles W. Parker, Collection of Herbs	1 00

AUGUST 5.

BEANS.— Two quarts of Goddard, Rev. Calvin Terry	$3 00
Half-peck of Horticultural, Isaac E. Coburn,	3 00
TOMATOES.— Twelve specimens of Emery, Varnum Frost	3 00
Any other variety, Samuel J. Trepess, President Cleveland,	3 00
Second, Varnum Frost, Comrade	2 00
Third, William C. Winter, Essex	1 00
Gratuities :—	
George M. Anderson, Cucumbers	1 00
Charles W. Parker, "	1 00
Charles E. Grant, Corn and Beans	2 00
Sidney Lawrence, Stratagem Peas	1 00
Warren Heustis & Son, Collection	3 00

AUGUST 12.

SWEET CORN.— Twelve ears, S. A. Merrill	3 00
Second, Hon. Aaron Low	2 00
Third, George M. Anderson	1 00
EGG PLANT.— Four Round Purple, Walter Russell	2 00
Gratuities :—	
Rev. Calvin Terry, Beans	1 00
S. A. Merrill, Potatoes	1 00
Isaac E. Coburn, Collection	3 00
Warren Heustis & Son, Collection	2 00
Charles W. Parker, "	1 00
Charles E. Grant, "	1 00
Walter Russell, "	1 00

AUGUST 19.

POTATOES.— Twelve specimens, Hon. Joseph S. Fay, Hebron	3 00
Second, Hon. Joseph S. Fay, Queen	2 00
Third, " " " " Rose	1 00
ONIONS.— Twelve specimens, Hon. Joseph S. Fay, Danvers	3 00
Second, Varnum Frost, Danvers	2 00
Third, Hon. Joseph S. Fay, Red	1 00
GREENFLESH MELONS.— Four, Isaac E. Coburn	3 00
CELERY.— Four roots, Warren Heustis & Son	3 00
Second, Varnum Frost	2 00
BEANS.— Two quarts of Goddard, Isaac E. Coburn	3 00
Second, Rev. Calvin Terry	2 00
SWEET CORN.— Twelve ears of Potter's Excelsior, Hon. Joseph S. Fay	3 00
Second, Rev. Calvin Terry	2 00
Third, Charles N. Brackett	1 00

Any other variety, Oliver R. Robbins, Burr's	$3 00
Second, Hon. Aaron Low, Crosby	2 00
Third, Samuel Hartwell, "	1 00
PEPPERS.— Twelve Squash, George W. Jameson	3 00
Second, Nathaniel T. Kidder	2 00
Third, Walter Russell	1 00
Any other variety, Hon. Joseph S. Fay, Ruby King	3 00
Second, Water Russell, Bull Nose	2 00
Third, Hon. Joseph S. Fay, Bull Nose	1 00
Gratuities :—	
Samuel J. Trepess, Tomatoes	1 00
Walter Russell, Egg Plant	1 00
" " Collection	3 00
Warren Heustis & Son, Collection	2 00
Dr. Walter G. Kendall, "	1 00

AUGUST 26.

CABBAGES.— Three, Hon. Joseph S. Fay, Reynolds	3 00
Second, Hon. Joseph S. Fay, Warren	2 00
Third, " " " " Brunswick	1 00
CAULIFLOWERS.— Four, A. M. Knowlton	3 00
Second, William H. Teele	2 00
CELERY.— Four roots, Warren Heustis & Son	3 00
BEANS.— Two quarts of Large Lima, Varnum Frost	3 00
Dwarf Lima, Hon. Joseph S. Fay	3 00
MARTYNIAS.— Twelve, E. W. Jordan	2 00
Second, Walter Russell	1 00
PEPPERS.— Twelve Squash, P. G. Hanson	3 00
Second, Richard T. Lombard	2 00
Third, Hon. Joseph S. Fay	1 00
Any other variety, Richard T. Lombard, Bull Nose	3 00
Second, Walter Russell, Bull Nose	2 00
Third, Nathaniel T. Kidder, Ruby King	1 00
Gratuities :—	
Warren Heustis & Son, Celery	1 00
Rev. Calvin Terry, Beans	1 00
Charles E. Grant, Sweet Corn	1 00
Charles N. Brackett, Excelsior Sweet Corn	1 00
P. G. Hanson, Tomatoes	1 00
Walter Russell, Collection	3 00
Isaac E. Coburn, "	3 00

SEPTEMBER 16.

GREENFLESH MELONS.— Four, Samuel Hartwell	3 00
Second, Hon. Joseph S. Fay	2 00
Third, Sumner Coolidge	1 00

SALMON FLESH MELONS.— Four, Hon. Aaron Low	$3 00
Second, Joseph S. Fay	2 00
Third, H. R. Kinney	1 00
WATERMELONS.— Pair, John Parker	3 00
Second, Rev. Calvin Terry	2 00
Third, Charles E. Grant	1 00
CAULIFLOWERS.— Four, A. M. Knowlton	3 00
Second, William H. Teele	2 00
LETTUCE.— Four heads, Walter Russell	3 00
Second, Warren Heustis & Son	2 00
Third, Hon. Joseph S. Fay	1 00
CELERY.— Four roots, Warren Heustis & Son	3 00
Second, Varnum Frost	2 00
Third, H. R. Kinney	1 00
PARSLEY.— Two quarts, Mrs. Mary T. Goddard	2 00
Second. Walter Russell	1 00
BEANS.—Two quarts of Large Lima, Varnum Frost	3 00
Second, Charles E. Grant	2 00
CORN.— Twelve ears of Potter's Excelsior, Charles N. Brackett	3 00
Second, Charles E. Grant	2 00
Third, Hon. Aaron Low	1 00
Any other variety, S. A. Merrill, Burr's	3 00
Second, William H. Hunt, "	2 00
Third, Marshall W. Chadbourne, Stowell's	1 00
EGG PLANT.— Four, Sumner Coolidge	3 00
Second, H. R. Kinney	2 00
Third, Whittier & Co.	1 00
TOMATOES.— Three varieties, Varnum Frost	5 00
Second, Hon. Aaron Low	4 00
Acme, twelve specimens, Varnum Frost	3 00
Second, Hon. Aaron Low	2 00
Third, S. A. Merrill	1 00
Cardinal, Isaac E. Coburn	3 00
Second, Hon. Aaron Low	2 00
Emery, Warren Heustis & Son	3 00
Second, Hon. Aaron Low	2 00
Third, Varnum Frost	1 00
Paragon, " "	3 00
Second, Hon. Aaron Low	2 00
Any other variety, P. G. Hanson, Livingston's	3 00
Second, Hon. Aaron Low, Essex	2 00
Third, " " " Beauty	1 00
PEPPERS.— Twelve Squash, George W. Jameson	3 00
Second, P. G. Hanson	2 00
Third, Hon. Aaron Low	1 00
Any other variety, Hon. Aaron Low, Ruby King	3 00
Second, Hon. Joseph S. Fay, " "	2 00
Third, Richard T. Lombard, Bull Nose	1 00

Gratuities :—

Hon. Joseph S. Fay, Collection of Melons	$3 00
Hon. Aaron Low, Twenty-four varieties of Tomatoes	5 00
Nathaniel T. Kidder, Tomatoes	1 00
Charles E. Grant, Lima Beans	1 00
Walter Russell, Collection	4 00
Varnum Frost, "	3 00
P. G. Hanson, "	2 00
Richard T. Lombard, Collection	1 00

SEPTEMBER 23.

Gratuity :—

Ettore Tassinari, Danvers Onions	1 00

ANNUAL EXHIBITION OF FRUITS AND VEGETABLES.

OCTOBER 4 AND 5.

Special Prizes.

CAULIFLOWERS.— Best four specimens and best kept during the exhibition, A. M. Knowlton	5 00
Second, William H. Teele	4 00
CELERY.—Best four specimens and best kept during the exhibition, Warren Heustis & Son	8 00
Second, Varnum Frost	6 00

Regular Prizes.

BEETS — Twelve Turnip Rooted, Varnum Frost	3 00
Second, Walter Russell	2 00
Third, H. R. Kinney	1 00
CARROTS.— Twelve Long Orange, H. R. Kinney	3 00
Second, Hon. Joseph S. Fay	2 00
Intermediate, Walter Russell	3 00
Second, H. R. Kinney	2 00
Third, Hon. Joseph S. Fay	1 00
PARSNIPS.— Twelve Long, Walter Russell	3 00
Second, H. R. Kinney	2 00
Third, Charles B. Lancaster	1 00
POTATOES.— Four varieties, Hon. Joseph S. Fay	5 00
Second, Mrs. Mary T. Goddard	4 00
Third, Charles B. Lancaster	3 00
Clark, Twelve specimens, E. C. Lewis	3 00
Second, Hon. Joseph S. Fay	2 00
Third, Mrs. Mary T. Goddard	1 00
Hebron, Charles S. Smith	3 00
Second, Hon. Joseph S. Fay	2 00
Third, Leonard W. Weston	1 00

Rose, Hon. Joseph S. Fay	$3 00
Second, Mrs. Mary T. Goddard	2 00
Third, F. J. Kinney	1 00
Savoy, Hon. Aaron Low	3 00
Second, Mrs. Mary T. Goddard	2 00
Third, Hon. Joseph S. Fay	1 00
Any other variety, Mrs. Mary T. Goddard, Polaris	3 00
Second, Mrs. Mary T. Goddard, Downing	2 00
Third, Hon. Joseph S. Fay, Queen	1 00
SALSIFY.— Twelve specimens, Walter Russell	3 00
TURNIPS.— Twelve Flat, F. J. Kinney	2 00
Second, P. G. Hanson	1 00
Swedish, Hon. Joseph S. Fay	2 00
Second, E. C. Lewis	1 00
ONIONS.— Twelve Danvers, Ettore Tassinari	3 00
Second, Walter Russell	2 00
Third, Hon. James J. H. Gregory	1 00
Red, " " " "	3 00
Second, George F. Stone	2 00
Third, Hon. Joseph S. Fay	1 00
White, " " " "	3 00
Second, George F. Stone	2 00
Third, H. R. Kinney	1 00
SQUASHES.— Three Hubbard, Samuel Hartwell	3 00
Second, Walter Russell	2 00
Third, Charles B. Lancaster	1 00
Hybrid Turban, Hon. Aaron Low	3 00
Second, P. G. Hanson	2 00
Marblehead, P. G. Hanson	3 00
Second, Mrs. Mary T. Goddard	2 00
Marrow, Varnum Frost	3 00
Second, P. G. Hanson	2 00
Third, Walter Russell	1 00
Turban, P. G. Hanson	3 00
BRUSSELS SPROUTS.— Half-peck, Nathaniel T. Kidder	3 00
CABBAGES.— Three Drumhead, Charles B. Lancaster	3 00
Second, Mrs. Mary T. Goddard	2 00
Third, Ettore Tassinari	1 00
Red, Hon. Aaron Low	3 00
Second, Ettore Tassinari	2 00
Savoy, Charles B. Lancaster, Green Curled	3 00
Second, Mrs. Mary T. Goddard	2 00
Third, Charles B. Lancaster, Drumhead Savoy	1 00
CAULIFLOWERS.— Four, William H. Teele	3 00
Second, Charles Morris	2 00
Third, A. M. Knowlton	1 00

Celery.— Four roots of Paris Golden, Warren Heustis & Son	$5 00
Second, Varnum Frost	4 00
Third, H. R. Kinney	3 00
Any other variety, Warren Heustis & Son	5 00
Second, H. R. Kinney	4 00
Endive.— Four specimens, F. J. Kinney	3 00
Second, H. R. Kinney	2 00
Third, Walter Russell	1 00
Lettuce.— Four heads, Walter Russell	3 00
Second, Hon. Joseph S. Fay, Deacon	2 00
Third, " " " " Tennisball	1 00
Parsley.— Two quarts, Walter Russell	2 00
Second, Mrs. Mary T. Goddard	1 00
Horseradish.— Six roots, H. R. Kinney	3 00
Second, Walter Russell	2 00
Corn.— Yellow or Field, twenty-five ears, Mrs. Mary T. Goddard	3 00
Second, William H. Hunt	2 00
Egg Plant.— Four Round Purple, H. R. Kinney	3 00
Second, Walter Russell	2 00
Tomatoes.— Three varieties, Isaac E. Coburn	5 00
Second, Samuel J. Trepess	4 00
Third, Hon. Aaron Low	3 00
Acme, Twelve specimens, Charles N. Brackett	3 00
Second, Hon. Aaron Low	2 00
Third, Charles E. Grant	1 00
Emery, Varnum Frost	3 00
Second, Hon. Aaron Low	2 00
Paragon, Artemas Frost	3 00
Second, P. G. Hanson	2 00
Third, Varnum Frost	1 00
Cardinal, Isaac E. Coburn	3 00
Second, P. G. Hanson	2 00
Third, Hon. Aaron Low	1 00
Any other variety, Isaac E. Coburn, Ignotum	3 00
Second, Artemas Frost, Stone	2 00
Third, Isaac E. Coburn, Chenery	1 00
Peppers.— Twelve Squash, George W. Jameson	3 00
Second, Hon. Aaron Low	2 00
Third, P. G. Hanson	1 00
Any other variety, Hon. Aaron Low, Ruby King	3 00
Second, Hon. Aaron Low, Bull Nose	2 00
Third, " " " Golden Queen	1 00

Gratuities: —

Charles N. Brackett, Sweet Corn	1 00
John Parker, Collection of Melons	2 00
Mrs. Mary T. Goddard, Collection of Beans	2 00

Hon. Joseph S. Fay, Collection	$6 00
P. G. Hanson, "	6 00
Walter Russell, "	6 00
Hon. Aaron Low, "	5 00
Warren Heustis & Son, "	4 00
H. R. Kinney, "	3 00
Hon. James J. H. Gregory, Collection	3 00
S. A. Merrill, "	2 00
Ettore Tassinari, "	2 00
Charles E. Grant, "	2 00

OCTOBER 14.

Gratuity :—

P. G. Hanson, Collection	2 00

NOVEMBER 11.

Gratuity :—

Charles A. Learned, Lettuce	1 00

EXHIBITION OF WINTER FRUITS AND VEGETABLES.

NOVEMBER 18.

CABBAGES.— Three Red, Hon. Aaron Low, Low's Mammoth	3 00
Second, Hon. Aaron Low, Buxton's Premium	2 00
Third, " " " Red Dutch	1 00
BRUSSELS SPROUTS.— Half-peck, Nathaniel T. Kidder	3 00
Second, George A. Nickerson	2 00
Third, Samuel J. Trepess	1 00
CAULIFLOWERS.— Four, William H. Teele	3 00
Second, A. M. Knowlton	2 00
Third, Samuel J. Trepess	1 00
CELERY.— Four roots, Warren Heustis & Son	3 00
Second, Varnum Frost	2 00
Third, H. R. Kinney	1 00
LETTUCE.— Four heads, H. R. Kinney	3 00
Second, Charles A. Learned	2 00
Third, Warren Heustis & Son	1 00
TOMATOES.— Twelve specimens, Winter Brothers, Early Essex	3 00
Second, Winter Brothers, Lorillard	2 00

Gratuities : —

P. G. Hanson, Turnips	1 00
Rev. Calvin Terry, Onions	1 00
Benjamin P. Ware, Kale	1 00
Charles E. Grant, Watermelons	1 00

H. A. Stevens, Mushrooms		$1 00
H. R. Kinney, Collection		5 00
Warren Heustis & Son, Collection		3 00
Walter Russell,	"	3 00
Ettore Tassinari,	"	2 00
Dr. Walter G. Kendall,	"	2 00

APPLETON SILVER MEDAL.

Rose and Strawberry Exhibition, June 22. Hon. Joseph S. Fay, eighteen varieties of Lettuce and superior cultivation of the same.

REPORT

OF THE

COMMITTEE ON GARDENS,

FOR THE YEAR 1893.

By JOHN G. BARKER, CHAIRMAN.

In presenting the report of our doings for another season we are glad to bring to your notice such facts as we trust will prove that there is continued interest in this department of our work. Were we to judge the interest by the competition for the various premiums there would be little reason for the continuance of the Committee; we have found it very difficult to arrange them so as to attract the attention of the various cultivators. The past season has been notable for few applications for the stated prizes, but we have been enabled to award gratuities, of which we do not doubt that you will approve, as just recognitions of superior skill in the various departments of horticultural productions.

CHARLES V. WHITTEN'S LILY HOUSE, DORCHESTER.

The first visit of the season was on the 13th of March, to inspect a house of Lilies. Mr. Cotter, the gardener, informed us that the house contained 1,500 bulbs in 1,100 pots, 1,000 of the bulbs being *Lilium longiflorum*, and 500 *L. Harrisii*. Most of these were grown singly in six, seven, or eight-inch pots, according to the size of the bulbs. They were all potted early in October, and placed in cold frames, where they were given a thorough soaking of water; then a handful of sand was placed upon the surface of each pot, after which a covering of two inches of sifted ashes was placed over the whole, which keeps the pots from drying out. After this a sharp lookout was kept for the first appearance of growth in the lilies, when all the ashes was

removed and the plants were gradually exposed to the light. About the middle of November they began to take them into the greenhouses, where they filled the room previously occupied by the chrysanthemums, and where they were retarded or forced as required.

The excellence of these two varieties for forcing is acknowledged by all cultivators everywhere; on looking up the various authorities we find but one opinion. From a list of acknowledged authority lying before us we copy the statement in regard to *L. longiflorum*, that the flowers are large, long, and trumpet shaped, with spreading segments; dull white outside, but very pure white inside; fine for forcing. *L. Harrisii* (*L. longiflorum floribundum* or the Bermuda Easter Lily) is a splendid variety, differing from the type in being more floriferous, and producing larger flowers, of fine substance, averaging four to five inches in length, and well opened at the mouth; the flowers are pure white, and of most delicious fragrance. This variety is excellent for forcing.

This Lily House was certainly all that could be desired; the plants were healthy and luxuriant, and the array of flowers was, to say the very least, beautiful to behold.

In our last report your attention was called to the Rose Houses; you will be interested to know that what we then stated to you was fully sustained by their promising appearance at our later visit. The house of Brunners was particularly noticeable; the plants were imported in November, 1891, and were placed in this house in January, 1892; an abundant crop was cut from them the following April, after which they were allowed to make their summer growth. When the wood was well ripened they were pruned, and they were started into growth the second week in January, 1893, to produce the crop which we saw March 17. In every respect this house was a model of cleanliness; the growth and luxuriant bloom afforded the best evidence of the skill and care that had been bestowed upon them.

Estate of Nathaniel T. Kidder, Milton.

This is the second year that this estate has been in competition for the Hunnewell Triennial Premium. In our last report your attention was called in a general way to the estate, and at our second visit everything was found in good order. The exhibits at the hall by Mr. Kidder have added to the interest of the shows, as the productions have been during the last season, as in pre-

vious years, of unusual merit; this with the fact that in all departments of the garden and grounds, skill and careful cultivation were noticeable, made the Committee unanimous in their opinion that the estate is worthy of continued consideration for the premium for which it is entered.

W. W. Lee's Aquatic Garden, Northampton.

September 13th, the Committee enjoyed another visit to this exceptionally attractive place. Liberal premiums were offered for Aquatic Gardens, in the hope that a spirited competition might be awakened in this very interesting and growing department of ornamental gardening, but we were disappointed in this respect, Mr. Lee having made the only entry. We can add but little to what was said in our last report. That Mr. Lee is enthusiastic in his determination that the aquatic garden should take a front place in the ornamentation of pleasure grounds, is apparent from the improved condition of his own garden over that seen last year. In addition to the Lilies which he had last season in the heated pond, there were this year *Nymphæa Caroliniana*, *N. Laydekeri rosea*, and *N. Marliacea albida*.

On the slope of a bank at the edge of a new pond which is being made exclusively for hardy Lilies, there have been planted over seven hundred Ferns. In that pond there were growing:

Nymphæa cærulea.
" *gracilis.*
" *Marliacea carnea.*
Nymphæa odorata gigantea.
Nelumbium speciosum.

The complete list of Nymphæas grown by Mr. Lee this season comprises twenty species and varieties, as follows,— though of some there are two or three plants.

Nymphæa albida candidissima.
" *cærulea.*
" *Caroliniana.*
" *dentata.*
" *Devoniensis.*
" *gigantea.*
" *gracilis.*
" *Laydekeri rosea.*
" *Marliacea albida.*
" " *carnea.*
Nymphæa Marliacea chromatella.
" " *rosea.*
" *odorata gigantea.*
" " *rosea.*
" " *sulphurea.*
" *rubra.*
" *Sturtevanti.*
" *tuberosa.*
" *Zanzibarensis.*
" " *rosea.*

MASSACHUSETTS AGRICULTURAL COLLEGE, AMHERST.

In connection with the visit to Mr. Lee's, a very pleasant and profitable afternoon was spent at the Agricultural College, under the guidance of Professor Maynard. The working of the horticultural department was explained to us by him, and that of the Agricultural by Professor Brooks, whose statements will be read with more than usual interest. This was the first time that an opportunity had been offered to visit the college grounds, and as the Society has a representation on its Board of Control, it is fitting that our members should know something of the working of this highly successful and well managed institution. The time was when it was looked upon as an expensive, unpractical luxury, its friends were few, and success seemed next to an impossibility; but time and the practical results of the persistent labors of the President and the Professors have changed public opinion from the point of prejudice to that of hearty coöperation, and the institution is now receiving—not too much by any means—the encouragement it so justly merits. Not more than one of your Committee had any idea of what had been, and is now being, accomplished by the institution, in sending out practical young men, thoroughly fitted to take up the different branches there taught, and practise them successfully in life. No mere theorists leave the institution — work they must — and the State and country are richer for it. We regret not being able to see President Goodell more than long enough to receive his hearty welcome, important engagements demanding his time; but we are more than glad to bring to you such good reports of the work of the College from the Professors already alluded to, and we ask for them your careful consideration of the same, and as far as possible your hearty and zealous coöperation by encouraging and advancing the good work that is being done there.

The following is Professor Maynard's statement:

REPORT OF THE BOTANICAL DEPARTMENT OF THE MASSACHUSETTS AGRICULTURAL COLLEGE, AMHERST, NOVEMBER 1, 1893. BY PROFESSOR S. T. MAYNARD.

The Botanical Department of the Massachusetts Agricultural College has under its management about seventy-five acres of land, divided nearly as follows: Apple orchard, 4 acres; Pear

orchard, 2 acres; Peach orchard, 4 acres; Cherry orchard, 1 acre; Plum orchard, 1 acre; Quince orchard, 1 acre; Grapes, 2 acres; Raspberries and Blackberries, 2 acres; Currants, ½ acre; Strawberries, 1 acre; Market Gardening Crops, 8 acres; Nursery, 2 acres; Lawn, ornamental grounds, roads, and walks, 15 acres; mowing land, grove and forest plantation, 30½ acres.

In all the fruit plantations the principal aim has been to grow a few trees only of all of the varieties of the most value in any locality, so that the products of this large area are not as profitable as would have been the case if fewer kinds had been planted.

In the market garden, small areas of all the leading kinds of vegetables are grown, in the most approved way, and the products are sold in the local markets, thus illustrating the methods of growing and marketing such crops.

The vineyards consist of two parts; the old vineyard devoted to growing commercial varieties, and the new vineyard, where all the new varieties are grown and tested.

The Old Vineyard.— The vines were set in this vineyard in 1869 — partly rooted vines, and the balance long cuttings planted three or four in a place, at the proper distance for permanent growth, which at that time was considered to be six by eight feet. The soil is a coarse sandy loam, mixed with an abundance of stones from the size of peas to a foot in diameter, and underlaid, at a varying depth of from two to four feet, with a hardpan subsoil.

The slope is directly to the south, and the vines are protected by a permanent grove on the north, a planted grove of larch and Scotch and Austrian pines on the west, and scattered trees in a grove on the south. At planting the land was manured with stable manure, and a crop of potatoes was grown between the rows the first season.

Heavy chestnut posts were set the second year after planting, with four wires of No. 14 galvanized iron, one foot apart, for the vines to run upon. The first wire is placed two and a half feet from the ground.

During the first fifteen years of its history, the vines were trained in a natural fan system, upon the trellis, and pruned on the spur system, *i. e.* all laterals coming out on the radiating arms were cut back after fruiting, to two buds. The vines are now trained on the one cane renewal system, *i. e.* one large cane is

grown each year along one of the lower wires, which is to produce the fruit the following season, while the fruiting cane, which is carried on the top wire during the season, is cut away, leaving only one or two buds from which a new cane must be grown to replace the successive fruiting canes.

The work of planting, cultivating, and pruning has largely been done by students, each member of the junior class being obliged to work long enough on the vines to master the systems of training and pruning.

It was in this vineyard that the first systematic experiments in girdling the vine were made in a commercial way, and here it was first proven that grapes from girdled vines contain a larger percentage of sugar than those grown on ungirdled vines, and that by this process many varieties which would not otherwise ripen in Massachusetts can be successfully grown. In this vineyard there are grown about twenty varieties, but the vines are principally Concords.

The New Vineyard.— The soil in which these vines are planted is a light sandy loam with a western exposure. Two vines of each variety are planted together, the vineyard including about a hundred and twenty-five varieties, over one hundred of which fruited the past season. The vines are trained to two wires, the fruiting cane being carried on the top wire, and the new cane for the next year's fruiting being grown on the lower wire.

One vine of the two of each variety, is used to test the value of insecticides and fungicides, the other being left untreated for the purpose of proving results.

In this vineyard records are made of the hardiness and vigor of the vines of the different varieties, and the time of blooming and of ripening the fruit. The fruit is gathered as nearly as possible when perfectly ripe, and placed in the cold storage room, where the keeping qualities of each variety are tested.

The results of all of the above mentioned trials are reported in the bulletins of the Hatch Experiment Station, as are also all experiments made in testing the qualities of all new varieties of other fruits.

Each variety is distinctly labelled with a large sheet-iron label placed in front of the first vine, so that every one may study the characteristics of each.

All new varieties reported as promising, are obtained as soon as possible after introduction; many from the originators, before

they are put upon the market, and careful comparison is made with older varieties, to determine their value for growth in New England.

The great want of our grape growers is a variety that will ripen so early as to escape early frosts. It is found that out of the large number of new varieties tested there are very few which are even as early as the Concord, and at the same time possess all the good qualities of that variety. A new variety must be earlier, equally hardy and productive, and of better quality, to be of any value to us, and unless they possess these superior characteristics should never be introduced.

A few of the recent introductions, however, have shown much promise, and if they continue to behave as well here, and in other localities, as they have in the past, will be valuable additions to our list. The two that show the most decided merit are the Winchell (Green Mountain) and Peabody.

The Winchell is a green grape of medium size of berry and bunch, of thoroughly good quality, and ripens with, or a little before, Moore's Early. The vine is vigorous, hardy, and productive, and the fruit is a good keeper, adhering to the stem for a long time after picking. Its color may be objectionable for market, but it certainly is valuable for home use.

The Peabody is a black grape, of larger size of bunch and berry than the Winchell, ripening with the latter. In quality it would not be called a sweet grape, but the pulp is tender, separating easily from the seeds, and of a pleasant, vinous quality. The foliage is like that of the Clinton, and other varieties of *cordifolia* origin, of a very firm texture and resistant to mildew. The keeping qualities of the Peabody have not been fully tested, but the indications are that it will prove a long keeper.

In view of our experiments we would recommend for general planting for home use and market, the following:

Black, Worden, Moore's Early, Concord, and Peabody.

Red, Brighton and Delaware.

White, Winchell, Lady, and Pocklington.

The land in both vineyards is kept thoroughly cultivated, especially in dry, hot weather, when the cultivator is run at least once each week, to keep the ground loose and free to prevent the rapid evaporation of the moisture.

The fertilizers used have been varied according to the previous growth of the vine. If the vines made but a small growth one

season, we have used in the next some stable manure; but the standing formula is 1,500 pounds of fine ground bone, and 500 pounds of muriate or sulphate of potash. With a good ordinary growth and medium crop of grapes this might be reduced to 1,000 pounds of fine bone and 300 of potash. This formula is recommended for all fruits in general.

SELECT LISTS.—The varieties of fruits our experience would lead us to suggest as best for home use and market are as follows:

Apples.— Red Astrachan, Oldenburg, Sweet Bough, Gravenstein, Fall Pippin, Hubbardston, Rhode Island Greening, Baldwin, Roxbury Russet.

Pears.— Margaret, Giffard, Clapp's Favorite, Bartlett, Sheldon, Bosc, Seckel, Anjou, Lawrence, Dana's Hovey.

Peaches.— Amsden's June, Rivers, Mountain Rose, Oldmixon, Crawford's Early, Crawford's Late, Reeves's Favorite, Crosby, Stump the World.

Plums.— Green Gage, Imperial Gage, Bradshaw, McLaughlin, Lombard, Abundance.

Cherries.— Napoleon, Gov. Wood, Early Richmond, Black Tartarian, Windsor, Downer.

Currants.— Fay, Cherry, Versaillaise, White Grape, Lee.

Blackberries.— Agawam, Snyder, Taylor.

Black-cap Raspberries.— Souhegan, Ohio, Hilborn, Kansas.

Red Raspberries.— Hansell, Thompson's Pride, Thompson's Early Prolific, Marlboro, Cuthbert, Golden Queen.

Strawberries.— Beder Wood, Haverland, Bubach No. 5, Beverly, Parker Earle.

GREEN HOUSES.— The glass structures consist of

One	large octagon,	40 x 40 feet x 28 feet high,	
"	" "	40 x 40 feet x 20	" "
"	rose room,	22 x 25 feet,	
"	dry stove or cactus room,	25 x 25 feet.	
"	moist stove or lily	" 22 x 25	"
"	stove	" 25 x 25	"
"	propagating	" 24 x 53	"
Two	"	" 37 x 18	"
"	carnation	" 37 x 18	"
One	vegetable	" 36 x 42	"
"	cold grapery	18 x 25	"
"	cool pit,	15 x 28	"

In the large houses are grown specimen plants of economic or educational value, while in the smaller houses are grown all kinds of bedding and flowering plants for the decoration of the grounds or for sale. In these houses numerous experiments are being made in the destruction of insects, and the prevention of fungous diseases attacking greenhouse plants.

In the construction of the houses, it has been the aim to introduce as many methods as possible of building, glazing, ventilating, and heating, that the students may know what is best in every line of greenhouse work.

On the grounds about the greenhouses and other buildings the lawn is kept closely mown, and trees, shrubs, and flowering plants are planted in large groups and masses, more than twenty-five thousand bedding plants having been set out on the college grounds during the past season.

AMHERST, Mass., Dec. 9, 1893.

My Dear Mr. Barker:— I send you today in another cover the list of varieties of fruits grown on our grounds. Many of them are young and have produced no fruit but are growing well and will serve soon to give us the needed information as to their value for New England.

It is our purpose to obtain every new variety of promise as soon as it is obtainable, and we would especially request all originators to send us specimens of any new and promising varieties of fruits, flowers, or vegetables.

When sent in this way we are under obligation to use our utmost vigilance that none of the stock shall become disseminated, and will report at the earliest possible date as to their value. We cannot, however, expect finally to determine the value of a variety until it has fruited several successive years.

Very truly yours,

S. T. MAYNARD.

APPLES.

Alexander,	Baldwin,
Arabskoe,	Beauty of Kent,
Arkansas Beauty,	Ben Davis,
Arkansas Black,	Benoni,
Atkins's Red,	Blue Annis,

Brilliant,
Carlough,
Catherine,
Cheeseborough Russet,
Chenango,
Chicago,
Crawford,
Delaware Winter,
Early Coltar,
Early Harvest,
Early Pennock,
English Codlin.
Fallawater,
Fall Orange,
Fall Pippin,
Fameuse,
Fanny,
Gano,
Garden Royal,
Gaus,
Gen. Lyon,
Gillyflower,
Golden Sweet,
Gravenstein,
Haas,
Hibernial,
Hubbardston,
Hurlbut,
Hyslop (Crab),
Indian Scion,
Jacobs Sweet,
Jeffries,
Jonathan,
Keswick Codlin,
Kinnard,
Lady,
Lady's Sweet,
Lankford,
Late Astrachan,
Leicester Sweet,
Lord's,
Maiden's Blush,
Mammoth Black Tug,
Mammoth Pippin,
Mann,
Marengo (Crab),
Marshall,
Minkler,
Minnesota Winter,
Monmouth,
Mother,
Northern Spy,
Oldenburg,
Ord Benie,
Orion,
Paragon,
Peck's Pleasant,
Pewaukee,
Pomme Royal,
Porter,
Primate,
Rambo,
Red Astrachan,
Red Bietigheimer,
Red Russet,
Roxbury Russet,
Salome,
Scarlet Cranberry,
Shiawassee,
Smokehouse,
Sops of Wine,
Stark,
Strawberry,
Stump,
Summer Pippin,
Summer Rose,
Sutton Beauty,
Swaar,
Sweet Bough,
Switzer,

Tetofsky,
Titovka,
Tompkins King,
Transcendent (Crab),
Vandevere,
Wagener,
Washington Royal,
Wealthy,
Westfield Seek-no-further,
White Russet,
Williams,
Winesap,
Winter Banana,
Yellow Bellflower,
Yellow Transparent,
Yellow Siberian (Crab).

PEACHES.

Alexander,
Amsden's June,
Chair's Choice,
Chapman,
Conklin,
Coolidge Favorite,
Crawford's Early,
Crawford's Late,
Crosby,
Elberta,
Ellison,
Foster,
Globe,
Hale,
Holland,
Hyatt,
Japan No. 7,
Japan No. 9,
Japan No. 10,
Lady Ingold,
Lovett's White,
Morris's White,
Mountain Rose,
New Prolific,
Oldmixon Free,
Red Cheek Melocoton,
Reeves's Favorite,
Rivers,
Russian,
Schumaker,
Seedlings of Crosby,
" from Japan,
" of Wager,
Stump the World,
Tong Pa,
Towne,
Wager,
Waterloo,
Wheatland,
Wonderful.

PEARS.

Angouleme,
Anjou,
Ansault,
Bartlett,
Belle Lucrative,
Bessemianka,
Bosc,
Boussock,
Buffum,
Clapp's Favorite,
Clairgeau,
Columbia,
Dana's Hovey,
Directeur Alphand,

Duhamel du Monceau,
Early Harvest,
Easter Beurre,
Flemish Beauty,
Frederick Clapp,
Garber,
Giffard,
Hoosic,
Howell,
Idaho,
Japan Golden Russet,
Jones,
Josephine of Malines,
Keiffer,
Krull,
Lady Duke,
Lawrence,
Lawson,
Le Conte,
Lincoln Coreless,
Louise Bonne of Jersey,
Marshall,
Merriam,
Mount Vernon,
Mystic,
Osband's Summer,
P. Barry,
Pratt,
President Clark,
President Mas,
Reeder,
Rostiezer,
Seckel,
Seneca,
Sheldon,
Souvenif du Congrès,
Student,
Superfin,
Tyson,
Vicar,
Volga (Wild Pear),
Wayland,
White Doyenne,
Wilder,
Winter Nelis.

GOOSEBERRIES.

Champion,
Columbus,
Crown Bob,
Downing,
Golden Prolific,
Houghton,
Industry,
Lancashire Lad,
Pale Red,
Red Jacket,
Roosch,
Smith,
Triumph,
Whitesmith.

CURRANTS.

Black Champion,
Black Naples,
Cherry,
Common Black,
Crandall,
Fay,
Greenfield,
Knight's Improved,
Lee,
London Red,
Moore's Selected,
North Star,

Prince Albert,
Red Dutch,
Seedlings,
Versaillaise,
Victoria,
White Dutch,
White Grape.

PLUMS.

Abundance,
Bavay,
Botan,
Botankio No. 1,
Botankio No. 2,
Bradshaw,
Brunswick,
Bryanstone,
Burbank,
Chabot,
Clyman,
Coe's Golden Drop,
Czar,
Damson,
Decaisne,
De Soto,
Duane's Purple,
Early Green Gage,
Excelsior,
Flower,
French Damson,
Garfield,
Gen. Hand,
German Prune,
Green Gage,
Guii,
Hawkeye,
Hortense,
Hottankio No. 1,
Hottankio No. 2,
Huling,
Illinois Iron Clad,
Imperial Gage,
Italian Prune,
Jefferson,
Kingston,
Lawrence,
Lincoln,
Lombard,
Lucombe's Nonesuch,
Manitoba Red,
Marie,
Massu,
McLaughlin,
Missouri Green Gage,
Monroe,
Moore's Arctic,
Niagara,
Ogon,
Oullin's Golden,
Orange,
Peter's Yellow Gage,
Pond's Seedling,
Pottawattamie,
Prince Englebert,
Prune d'Agen,
Prune French Petite,
Puritan,
Quackenboss,
Red June,
Saratoga,
Satsuma Blood,
Shipper's Pride,
Shira tra Beni,
Simoni,
Smith's Orleans,

Spaulding,
Stanton,
Tragedy,
Ura Beni,
Washington,
Weaver,
Wild Goose,
Wolf,
World Beater,
Yellow Egg,
Yocobe.

APRICOTS.

Acme,
Alexis,
Bengoume,
Early Moorpark,
Gibbs,
Gold Dust,
Hubbard,
Montgamet,
Moorpark,
Peach,
Purple,
Russian.

NECTARINES.

Downton,
Goliath.

CHERRIES.

Belle Magnifique,
Black Heart,
Black Tartarian,
California Advance,
Centennial,
Choisy,
Coe's Transparent,
Downer,
Dyehouse,
Early Purple,
Elton,
Empress Eugenie,
Gov. Wood,
Large Montmorency,
Late Richmond,
Louis Philippe,
Mezel,
Montmorency Ordinaire,
Napoleon,
Olivet,
Ostheim,
Rockport Bigarreau,
Royal Duke,
Suda Hardy,
Windsor,
Wragg.

QUINCES.

Champion,
Columbia,
Meech's Prolific,
Orange,
Rea,
Seedlings.

GRAPES.

Agawam (Rogers No. 15),
Amber,
Amber Queen,
Antoinette,
Armenia (Rogers No. 39),
Arnold's No. 1,
" " 2,
" " 16,
Augusta,
August Giant,
Bacchus,
Barry (Rogers No. 43),
Beauty,
Belinda,
Berckmans,
Bertha,
Black Eagle,
Brighton,
Brilliant,
Catawba,
Caywood's No. 50,
Centennial,
Champion,
Charter Oak,
Clinton,
Colerain,
Concord,
Concord Muscat,
Cottage,
Creveling,
Cynthiana,
Delaware,
Delaware Muscat,
Diana,
Early Ohio,
Early Victor,
Eaton,
El Dorado,
Elsinburgh,
Elvira,
Emma,
Empire State,
Essex (Rogers No. 41),
Esther,
Etta,
Excelsior,
Faith,
Geneva,
Goethe (Rogers No. 1),
Golden Drop,
Golden Gem,
Grein's Golden,
" No. 2,
G. W. Campbell.
Hartford,
Hayes,
Herbert (Rogers No. 44),
Herman Jaeger,
Highland,
Howard's Seedlings,
Ideal,
Illinois City,
Iona,
Isabella,
Janesville,
Jefferson,
Jessica,
Jewell,
Lady,
Lady Washington,
Lee's Prolific,
Lindley (Rogers No. 9),
Maria Louisa,
Martha,
Massasoit (Rogers No. 3),
Merrimac (Rogers) No. 19,
Mills,
Montefiore,
Moore's Diamond,
Moyer,

Nectar,
Niagara,
Norfolk,
Norman,
Northern Muscat,
Norton,
Oneida,
Oriental,
Peabody,
Pearl,
Perkins,
Pizarro,
Pocklington,
Poughkeepsie Red,
Prentiss,
Rebecca,
Requa (Rogers No. 28),
Rochester,
Rockwood,
Rogers No. 30,
" " 32,
" " 33,
" " 34,
Rommel,
Salem (Rogers No. 53),
Secretary,
Seedling No. 5,
" " 7,
" " 9,
Seedling No. 10,
" " 15,
" " 18,
" " 19,
" " 42,
" " 44,
Standard,
Stayman's No. 3,
" " 4,
" " 42,
" " 44,
" " 47,
Telegraph,
Transparent,
Triumph,
Ulster Prolific,
Union Village,
Vergennes,
Victoria,
Vitis Arizonica,
" Californica,
" cordifolia,
" Mexicana,
Walter,
Wilder (Rogers No. 4),
Wilding,
Woodruff Red,
Worden,
Wyoming Red.

BLACKBERRIES.

Agawam,
Crystal White,
Early King,
Erie,
Fred,
Hoosier,
Lovett's Best,
Lucretia,
Minnewaski,
Ohmer,
Snyder,
Stone,
Taylor,
Topsy,
Wachusett,
Western Triumph,
Wilson,
Woodford.

Red Raspberries.

Brandywine,
Champion,
Crimson Beauty,
Cuthbert,
Fontenay,
Gladstone,
Golden Queen,
Hansell,
Herstine,
Highland Hardy,
King,
Marlboro,
Naomi,
Rancocas,
Scarlet Gem,
Stayman's No. 5,
Superb,
Superlative,
Thompson's Early Prolific,
Thompson's Pride,
Victor,
White Mountain.

Black-cap Raspberries.

Ada,
Brackett's Seedling,
Carman,
Cluster,
Corinth,
Crawford,
Cromwell,
Earhart,
Eureka,
Hilborn,
Howard's Seedling,
Kansas,
Lovett,
Nemaha,
Ohio,
Older,
Palmer,
Progress,
Smith's Prolific,
Souhegan,
Springfield,
Wade,
Winona.

Strawberries.

Accomack,
Alabama,
America,
Auburn,
Barton's Eclipse,
Beaver's No. 3,
Beder Wood,
Beebe,
Belle la Crosse,
Belmont,
Beverly,
Boynton,
Brandywine,
Bubach No. 5,
Chairs,
Charles Downing,
Charlie,
Childes,
Cornelia,
Crawford,
Crawford's No. 51,
Crescent,

Cumberland,
Cutter's Seedling,
Cyclone,
Davis No. 2.
Dayton,
Dew,
Dutton,
Edgar Queen,
Edith,
Epping (*Synonym* Yankee Doodle),
E. P. Roe,
Equinox,
Eureka,
Felton,
Florence,
Gandy,
Gen. Putnam,
Gillespie,
Glendale,
Golden Defiance,
Gov. Hoard,
Greenville,
Haverland,
Hinsmore,
Howard's No. 10,
" " 13,
" " 20,
" " 28,
" " 34,
" " 39,
" " 41,
" " 53,
" " 76,
" " 116,
" " 117,
" " 122,
" " 145,
" " 149,
" " 157,
Howard's No. 250,
" " 300,
" " 501,
" " 601,
" " 605,
Jay Gould,
Jewell,
Jucunda,
Lady Rusk,
Laxton's Captain,
" Commander,
" Noble.
Leader,
Lennig's White,
London,
Lovett's Early,
Luther,
Marshall,
Martha,
Michell's Early,
Meek's Early,
Middlefield,
Miller's Seedling,
Miner,
Moore,
Mount Holyoke,
Mrs. Cleveland,
Muskingum,
Norwood,
Ohio Centennial,
Oliver,
Oregon,
Our Choice,
Pacific,
Parker Earle,
Parmenter's Seedling,
Phillip's "
Pioneer,
Pomona,
Princess,

Princeton Chief,
Regina,
Riehl's No. 1,
Richmond,
Rio,
Sadie,
Sandoval,
Saunders,
Seedling No. 24,
" " 34,
" " 35,
" " 40,
" " 41,
" " 42,
" " 44,
" " 45,
" " 46,
" " 47,
" " 48,
" " 49,
" " X,
" " XX,
Sharpless,
Shaw,
Shuckless,
Shurtleff's Seedling,
Shuster's Gem,
Smeltzer's Early No. 2,
Southard,
Standard,
Stayman's No. 1,
Sterling,
Stevens,
Sunnyside,
Swindle,
Tennessee,
Thomson's No. 66,
Timbrel,
Townsend's No. 20,
Triomphe de Gand,
Van Deman,
Waldron,
Walton,
Warfield,
Warren,
Westbrook,
West Lawn,
Williams,
Wilson,
Woolverton,
Yale.

PROFESSOR BROOKS'S STATEMENT.

AMHERST, Mass., February 15, 1894.

MR. JOHN G. BARKER, Jamaica Plain:

Dear Sir: — I send you herewith a statement concerning our field of potatoes, as requested. I should have sent this earlier had it not been for the fact that our crop, which was put into pits, had not all been sorted or exactly measured. It was measured in baskets (bushel and two-bushel) as picked up. We have been sorting and measuring more exactly as we have had opportunity to sell, and I have hoped to finish before the report would be needed, so that I might be more exact. The tubers run large and of fine

quality, being very smooth and even. I feel sure the crop has not been overestimated or overvalued. The sale is rather slow and will not probably be completed for some time yet. I therefore send the report now, with regrets that I cannot be more precise.

Truly yours,

WM. P. BROOKS.

POTATOES.

Area, 12.21 acres. Soil, medium loam, well drained and warm.

History of the Field.— Previous to the fall of 1890, it had been pastured for five or six years; it was ploughed late in the fall of 1890, and in the following spring harrowed and planted to potatoes, fertilizers only being used. It was ploughed in the fall of 1891 and five acres sown to rye; which was mostly cut for fodder, and followed by squashes in 1892. On the balance of the field, in 1892, we had two acres of soya beans, on manure and fertilizer; two acres of Japanese millet, and three acres of mangolds, all receiving both manure and fertilizers in moderate amounts.

Management of the Crop of Potatoes.— The entire field was ploughed in the fall of 1892, and during the winter it was manured at the rate of four cords per acre of strong manure, made by milch cows, and spread as drawn from the cellar.

The land was lightly reploughed in the spring of 1893, and the following fertilizers were applied per acre:

Nitrate of soda, 125 pounds; plain superphosphate, 400 pounds; South Carolina rock phosphate, 300 pounds; bone meal, 100 pounds; and high grade sulphate of potash, 300 pounds.

These fertilizers were mixed just before use, and were put on broadcast with the Acme fertilizer distributor, and harrowed in. The seed was Beauty of Hebron, of our own raising, but from stock imported from Maine in 1891. Medium to large tubers, cut into three or four pieces by hand, were planted. The work was done with the Aspinwall potato planter, the rows being three feet and four inches apart, and the pieces were about sixteen inches apart in the row. The field was rolled after planting. It was harrowed once just before the plants came up, and again when they were very small. Later they were cultivated with the Syracuse cultivator twice, and finally were slightly ridged with Prout's horse hoe. Little hand work was done, but six men walked

through the field with hoes when the crop was about half grown, cutting out weeds that were left by the cultivator, spending one day at the work. Later, after the crop covered the ground, the same amount of time was spent in hand pulling weeds.

The crop was dug during the latter part of September, Hallock's potato digger being used on the greater part of the field. This does not bring all the tubers to the surface, and the potato hook was used to rake them out of the loosened earth. By far the largest item of cost is that for digging.

Below is the account:

Dr.

To ½ cost of manure at $4.00 per cord . .	$100 00
" ¾ " " fertilizers	150 00
" 125 bushels seed at $1.00	125 00
" preparing land, planting, and cultivating .	161 00
" cost of digging	178 00
	$714 00

Cr.

By 3,500 bushels of potatoes at $ .50 . .	$1,750 00
Balance in favor of crop . . .	1,036 00

CHRYSANTHEMUMS.

The place which the Chrysanthemum now holds as a fall decorative plant justified the Committee in offering prizes that would encourage the grower to show his best skill in their production. It is one thing to see them in the Hall arranged for exhibition purposes; it is quite another to see them arranged in the conservatory for their best effect. As might have been expected we received several applications, nearly all the places possessing points of merit, and we have tried in our awards to recognize all who applied, in a way which we trust will be satisfactory to the applicants.

In these days of advanced cultivation of this popular flower, when so much is being written and published in every horticultural journal, and special papers have been prepared and presented to societies, it does not seem wise for us to undertake any extended remarks in this report, and we will only call your attention to the statements of those to whom prizes have been awarded.

WALTER HUNNEWELL'S CHRYSANTHEMUM HOUSE, WELLESLEY.

We have taken pains to describe as correctly as possible the varieties in this collection, which received the first prize, and which were in every way a very superior lot. They were grown by T. D. Hatfield, gardener to Mr. Hunnewell.

A. H. Fewkes.— Yellow, a bushy, even grower, with good clean foliage down to the pot; in fact this feature characterizes all of the young plants.

Cullingfordii.— The brightest shade of crimson; a large and fine reflexed flower.

Duchess of Connaught.— Pink.

Eiderdown.— White.

Fascination.— A large lemon yellow flower, with long twisted petals.

George W. Childs.— Deep crimson, without any shade of brown; the best of its color.

Gloriana.— Clear lemon yellow; petals broad, folded, and incurved into a ribbon-like ball — a rare feature.

Gougac.— Particolored; a sport from Mrs. Irving Clark, and identical with that variety except in color. Mrs. Irving Clark is a pink variety, and this is normally a white sport from it, but the plant which the Committee saw had sported back to some extent, some flowers being partly white and partly pink in all shades or degrees, or wholly pink or white or bronze. It is more desirable for exhibition than for commercial use.

Ivory.— Pure white, and said to be the finest white in cultivation.

Joseph H. White.— A white, globular flower.

Lady Mayfair.— Pink.

Louis Bœhmer.— Silvery pink.

Mrs. Bishop.— Lemon.

Mrs. Hicks Arnold.— Large, full, double flowers, of an old gold color, lighting up wonderfully under electric light.

Mrs. Jerome Jones.— White; the most beautiful late white in cultivation.

Mrs. Joseph Rossiter.— Blush white.

Mrs. Walter Baker.— Orange.

Mrs. W. G. Newitt — White flower of immense size; a very valuable variety.

Olga.— Pink; large, and has many good traits, but has been superseded by newer sorts.

V. H. Hallock.— Pearly rose, deeper in the centre.

Walter Hunnewell.— Bronze yellow; extra large, perfectly double, incurved, dwarf.

W. H. Lincoln.— Bright yellow; a large, splendid flower.

William Falconer.— Large, white, shaded with pink. The catalogues all speak in raptures of this variety.

In regard to Mr. Hatfield's method of culture, we are happy to present the following notes by him:

"In size the plants were very even. Ivory measured four feet six inches in diameter, and was the smallest; Hicks Arnold, six feet six inches; this was the largest. Others measuring six feet were Louis Bœhmer, A. H. Fewkes, Joseph H. White, and Mr. H Cannell. The remainder measured between five and six feet each.

I strike cuttings in February and keep the plants growing steadily, not forcing with rich soil, stimulants, or heat. About the middle of May, I shift my plants into ten to twelve-inch pots, having carried them along until this stage in seven-inch. The soil, not an important feature, is moderately rich. The drainage is good. I do not pack firmly, or fill the pots very full, leaving room enough for an inch or so of top dressing. Stopping is done regularly, almost daily; the main object being to keep the plants even, looking out for any runaway shoots and encouraging weaker ones. I discontinue stopping about the first of August, but do not hesitate to take out a stronger shoot, if one appears after that date, or indeed at anything necessary to keep the plants symmetrical, which is easier than tying them so.

Watering and the application of stimulants are the most important elements of success. When the drainage is good, water can be applied freely, but it must always be with a thorough knowledge of the needs of individual specimens. Withhold stimulants from a sick plant, and also from a very vigorous plant. Syringing can be done three times a day during bright weather, and must be thorough to keep down insects. Disbudding must be practised vigorously, with very few exceptions. I allow more than one bloom to a shoot in order to fill out a thin spot. I discontinue stimulants when the buds show color, and give a little fire heat, with less side air as a precaution against mildew."

ARTHUR HUNNEWELL'S CHRYSANTHEMUM HOUSE, WELLESLEY.

To this was awarded the second prize for the best house of Chrysanthemums; it contained many fine specimen plants. The varieties were

Ada Spaulding,
C. B. Whitnell,
Cullingfordii,
Duchess of Connaught,
Étoile de Lyon,
George W. Childs,
Harry May,
Ivory,
Joseph H. White,
Joseph Lester,
L. Canning,
Louis Bœhmer,
Mabel Ward,
Miss A. Manda,
Mrs. Alpheus Hardy,
Mrs. H. Baker,
Mrs. Hicks Arnold,
Mrs. Irving Clark,
Mrs. Jerome Jones,
President Hyde,
Robert Bottomly,
Savannah,
Walter Hunnewell,
W. H. Lincoln,
Yellow Ball.

H. H. HUNNEWELL'S PLANT HOUSES, WELLESLEY.

In connection with the visits to the two places above named, a call was made at H. H. Hunnewell's. The conservatory was charmingly arranged in the most tasteful manner. In the windows opposite the drawing room, the superb display of Orchids was an exhibition in itself; the Cattleyas could not be excelled. The conservatory proper was arranged chiefly with Chrysanthemums; on either side was a row of Yews, forming a fine background for the flowering plants; while four large Seaforthias at either end, with Dracænas and other foliage plants placed among the Chrysanthemums, lessened materially the sameness of so many flowers in a large body. The effect of this combination was very pleasing, and furnished a good suggestion for those who arrange plants for effect in exhibitions. A hasty look through the other houses, showed the same excellent care that has always characterized this fine estate. It is always a pleasure to visit Mr. Hunnewell's grounds, and Mr. Harris's cordiality is as unbounded and hearty as ever, and although he realizes and acknowledges that he is not as young as he once was, his enthusiasm is unabated, and progressive horticulture is as ardently encouraged by him now as in the years long since passed.

John L. Gardner's Plant Houses, Brookline.

By invitation of C. M. Atkinson, the gardener, the afternoon of November 14 was very pleasantly and profitably spent in looking over the various houses and the grounds at this well kept place. As a rule, at this season of the year, but little is expected in the way of flowering plants except the Chrysanthemum, but of these there was an excellent display — combined with foliage plants — in the vineries. A broad walk extended through the centre, and the plants were arranged on either side, and by opening the large double doors, leading into the adjoining greenhouse, a very pleasing effect was obtained. Although it was evident that the plants were not grown for specimens, each one might properly be called a specimen plant, for they were all nice plants and of a a size easy to handle. The collection was large and choice, embracing the leading varieties. We all well know that what Mr. Atkinson does, is always well done, and for effective display your Committee have not seen any houses more artistically arranged than this one, and the conservatory of H. H. Hunnewell, already alluded to. To give a list of the varieties is unnecessary as two lists have already been given, which is quite sufficient to guide any one desirous of making up a collection.

The plants in the other houses were all in excellent condition, especially the cool orchids, on which the promise of an abundant bloom later in the season was visible. Bulbs were growing in the frames in abundance; the stocky and healthy Cinerarias and Primulas in the frames already indicated what might be looked for later on, and at a future time we hope to be able to give a more detailed account of the many choice things found at this place.

Charles V. Whitten's Chrysanthemum Houses.

A commercial establishment is by no means void of interest, especially where good cultivation is the rule. In the first part of this report your attention was called to the lilies produced at this place, and we now take pleasure in giving to you an account of the Chrysanthemums grown here. Mr. Cotter informed the Chairman of your Committee, that they intend to discard every variety, no matter what good qualities it may otherwise possess, if it is not a first class marketable kind. This year there were fifteen thousand plants of Chrysanthemum grown for their flowers, in five

houses; each plant bore from one to four flowers, according to its strength at the time of planting. The first house was planted on the 5th of July, the last on August 1. Flowers were being cut and marketed in quantity by the 15th of October, and it is expected they will continue until the middle of December. Mr. Cotter adds that chrysanthemum growing is not a paying industry this year. The varieties which are grown in large quantities are:

White, Ivory, Miss Minnie Wanamaker, Pelican, and Mrs. Humphries.

Pink, Mrs. John M. Gerard, Viviand Morel, V. H. Hallock, Ada Spaulding, L. B. Bird.

Yellow, Golden Wedding, W. H. Lincoln, Mrs. Craig Lippincott, Rohallion, H. E. Weidner.

Red, Cullingfordii, G. W. Childs.

Bronze, Harry May.

Mr. W. J. Clemson's Chrysanthemum House, Taunton.

November 1, the Committee visited the conservatory of Mr. W. J. Clemson, Taunton, which was filled with Chrysanthemums. The house containing the plants is a curvilinear structure, thirty-five by twenty-nine feet, with side benches, and a centre bench of four tiers. There were one hundred and fifty plants in ten-inch and twelve-inch pots, and about one hundred in six-inch pots. The number of varieties is seventy-five, and the mode of propagating and growing them is about the same as is practised by other growers. It may be of interest if we state that the final potting is about the 20th of June, and no pinching is done after July 10, unless it is upon straggling shoots. Plants are looked after twice daily during the hot summer months, and no water is given unless the plants really require it. A good syringing is given each evening after hot, sunny days. Very little liquid manure is given until the flower buds appear, after which it is given two or three times a week. Sulphate of ammonia and pulverized sheep manure are used alternately until the flowers are well developed. To ward off the attack of the black fly and chrysanthemum fly, the plants are syringed once in five days with kerosene emulsion or tobacco water.

The plants were all neatly staked and labelled, and were tastefully arranged. The varieties were well selected. The other houses in the range contained a miscellaneous collection of plants, such as

is usually found in a private place. Mr. W. N. Craig is the gardener and has been there about a year.

It will be noticed that we have devoted considerable time and space to the Chrysanthemum. Never before was it so generally grown, and to such perfection. The horticultural press and the daily papers every year inform us of exhibitions where none were ever held before, and the enthusiasm has justified the Society, through its three different Committees in recognizing this fact, and the Garden Committee have tried to do their full share without the appearance of riding a hobby to the neglect of other interests.

Forced Vegetables.

For several seasons there was offered a prize for the best house or houses of Forced Vegetables; but the only ones entered in competition were those of Mr. Varnum Frost, of Arlington, and they were reported upon at the time. The Committee have always been desirous of recognizing this and all other industries that would be of interest to the Society; but for some unknown reason we have not been invited to any other of these establishments, and have only seen them as individuals. The Chairman of your Committee, being in Arlington one afternoon, visited Warren W. Rawson, and very much enjoyed looking over his extensive establishment with him, and receiving from him a description of his system of working it. With the consent of the Committee the Chairman presents the following items of interest, which we hope may be acceptable to the Society.

The capacity of Mr. Rawson's plant is quite large, covering an enclosed space of 120,000 square feet of ground, the houses being especially arranged for growing lettuce and cucumbers. The first sowing of lettuce seed is in August, and additional sowings are made every five days until time to set out of doors. With so large a space Mr. Rawson can raise and head at one time, fifteen thousand dozen of lettuce. There are fifteen houses; the largest is 400 feet long by 52 feet wide. The larger ones are used for heading the lettuce. Those for growing the plants, which Mr. Rawson considers small, are 130 feet long by 22 feet wide. A new crop of plants for heading is set in one of the larger houses each week. There are eight of these houses for heading and it takes about eight weeks to mature a crop in the months of

October, November, December, and January. By this arrangement there are two thousand dozen of lettuce for sale each week until May 1st. Preparations are made for cucumbers, and they commence setting the plants in the houses about January 15. These begin bearing in about four weeks after the first house is set, the others following about one week apart as the lettuce is taken out. When there are a number of houses in bearing the quantity of cucumbers produced is from ten to fifteen thousand per day. There are three crops of lettuce, and one crop of cucumbers, grown in each house every season. You will see that a large number of men are required to run a plant of this size. The heating is done by steam. There are six boilers of from forty to sixty horse power each; two are placed side by side, of which one is run in moderate weather, and both in very cold weather, and it takes 700 tons of Cumberland coal each season to do what is required. In addition to the houses, three thousand hot-bed sash are used, the whole producing over one million heads of lettuce and as many cucumbers each season, which are all sold in Boston and New York. At this time (December 15, 1893), Mr. Rawson is shipping over one hundred barrels of lettuce to New York each week.

This very brief outline of a plant of the magnitude of this one, gives only a very general idea of what it is; the details would make a small book. A very important item of course is the capital — which cannot be a small one — with which to run it. Then the management enters largely into the results; it is very easy to sink one's capital in the management, but the thorough system of working, which was clearly manifest from the seed bed to the matured crop, gave abundant evidence of the success of the management. Some may suggest that a comparison of expenses and receipts would be the best evidence of financial success, but as the prices of supplies vary, and also those obtained for the produce, it might be a misleading statement. One thing is sure, that where the plant is being enlarged each year, there must be reasonable success, and as Mr. Rawson has had fifteen years' experience, we feel confident that the statement here presented as the result of that experience, will commend itself to your consideration.

The Committee have made the following awards:

PRIZES.

For the best aquatic Garden, to William W. Lee, Northampton	$50 00
For the best house of Chrysanthemums, to T. D. Hatfield, Gardener to Walter Hunnewell, Wellesley	50 00
Second, to Arthur Hunnewell, Wellesley	30 00

Gratuities:—

To Lawrence Cotter, Gardener to Charles V. Whitten, Dorchester, for a fine house of Lilies, grown for commercial purposes	40 00
To Lawrence Cotter, Gardener to Charles V. Whitten, Dorchester, for fine houses of Chrysanthemums, grown for commercial purposes	40 00
To John L. Gardner, Brookline, for a house of Chrysanthemums, in excellent taste with other plants	40 00
To W. N. Craig, Taunton, for a house of Chrysanthemums	20 00
To the Massachusetts Agricultural College, Amherst, for a well cared for and successfully cultivated Vineyard	50 00
To the Massachusetts Agricultural College, for successful general cultivation of Fruits	30 00
To the Massachusetts Agricultural College, for successful cultivation of Vegetables	50 00
To Warren W. Rawson, for superior cultivation of Vegetables, under glass	40 00
Total awards	440 00
Unexpended balance	60 00
Amount appropriated	$500 00

Respectfully submitted,

JOHN G. BARKER,
E. W. WOOD,
DAVID ALLAN,
A. H. FEWKES,
C. N. BRACKETT,
HENRY W. WILSON,
JACKSON DAWSON,
Committee on Gardens.

REPORT

OF THE

COMMITTEE OF ARRANGEMENTS,

FOR THE YEAR 1893.

BY JOSEPH H. WOODFORD, CHAIRMAN.

The exhibitions of our Society, during the past year, have been quite as numerous as in former years, yet at only two of them has there been an admittance fee asked. The Committee for Establishing Prizes made up the Schedule with this end in view, and it has been faithfully carried out by the Committee of Arrangements.

About the same amount of labor is required whether the shows carry an admittance fee or whether they are free; therefore it does not make an appreciable difference in the labor required at an exhibition, but it does make a difference in the attendance at the shows, a greater number of persons coming to our free shows than to the shows where an admittance fee is charged.

We report that all the exhibitions have been very fully attended throughout the year, and we append hereto the statement of receipts and expenditures as taken from the Treasurer's books. The balance in favor of the Society does not differ much from that of last year, and would not have been very much augmented if we had charged an admission fee to all the principal shows.

We are more than ever under obligations to the newspaper reporters, who so eloquently described in fitting terms our various exhibitions, for their notices during the year have been copious and commendatory. We are also pleased to note that more

interest than usual has been manifested during the past year by the owners of plants and their gardeners, in contributing to our shows, thus making them successful as exhibitions and worthy of our Society.

The arrangement of the plants and flowers during the year has been so varied as to produce the most pleasing effect, and has met the general approbation of the public.

The other Committees, in their yearly reports, will tell you of the progress we are making in the noble art of Horticulture, and we have no doubt that their reports will be read with pleasure by every member of our Society.

The receipts of the		
Spring Exhibition were	$372 00	
Chrysanthemum Show	1,292 00	
		$1,664 00
Expenditures:		
Spring Exhibition	$280 10	
Chrysanthemum Show	289 05	
		569 15
Showing a balance of . . . . which has gone into the Treasury of the Society.		$1,094 85

All of which is respectfully submitted,

JOSEPH H. WOODFORD,
Chairman.

REPORT

OF THE

COMMITTEE ON WINDOW GARDENING,

FOR THE YEAR 1893.

By Mrs. HENRIETTA L. T. WOLCOTT, Chairman.

In considering the preparation of a report for the Committee of which I am the Chairman, I am compelled to ask your attention to a recital, which may seem tedious, but which it is hoped may not prove uninteresting.

In the near future the Committee will suggest a change of title from that of "Window Gardening Committee" to that of "Committee on Children's Herbariums and School Gardens." The reasons why the suggestion is made and the reasons why the petition should be granted ought to be made somewhat prominent at this time.

In the year 1878 a request from parties, not active members in this Society, but philanthropists in the grandest sense, was placed before the Society. Funds to defray all expenses incurred in carrying out their plan, were promised. It was to teach children to raise flowering plants in pots and to care for them, that desolate homes might become attractive. This appealed to a number of willing workers. The first Committee appointed by the President, expected to work early and late, in an untried field, without pecuniary consideration, but to be recompensed if in so working the end desired by the founders of this Society should be accomplished.

To reach the children in so large a city as Boston, at the first stage of the experiment, correspondence was held with the Superintendents of large Sunday Schools and Missions and other organizations for children. Clergymen became cordially interested, and the suggestion of the Committee, to substitute growing plants for cut flowers at Easter, was at once adopted. The mercantile value of this idea to florists should have won over that industrious class of our citizens. In one season over thirteen thousand plants in pots were distributed in Boston and the suburban churches, while in other cities and towns, the same relative increase was observed. Changes among the earnest friends of the movement dampened the ardor of the Committee. Of the six pastors whose coöperation was so helpful, two, Rev. Mr. Gerry of the Hanover street District Mission, and Rev. Phillips Brooks, are no longer living; two have removed to other parishes—one to an asylum for over taxed clergymen.

The two remaining friends saw with regret the difficulties which confronted the Committee. The greatest was the indifference of the members of this Society—trivial, you may think when others meet it, but quite important when we ourselves are the annoyed.

Another difficulty was found in securing the plants at the hour advertised, with also the added difficulty of disposing of their owners during the time devoted to the exhibition, for little children could not come alone from the suburbs, and the expense of car fares often exceeded the sum awarded for the well-raised geraniums. Out of the city, where teachers or others devoted themselves to the work, most excellent results were obtained. In one instance, over two hundred plants were exhibited, with many vases of native flowers culled in the fields, and prizes were awarded for those advertised, while gratuities were granted when patience was shown in keeping pot and plant clean.

Soon the Committee dwindled. Raising, not forcing, small plants was not profitable, and for several seasons the working force of the Committee consisted of but two members. The correspondence was no small item in the burden carried. The experiment attracted attention in many localities, and letters of inquiry as to the methods adopted, were received.

In obedience to a demand for some simple directions to children, as to collecting blossoms for exhibitions, in July, August, and September, and where and when to look for them; also regarding

the care of plants in pots, a small pamphlet was compiled for general distribution.

While we were quite satisfied with this, we soon became conscious of the narrowness of scope in the plan. We had become inoculated, as it were, with the sentiment so often witnessed in this, our beloved headquarters.

We had lost sight of the fact that the whole state of Massachusetts would be traversed by earnest scholars, searching for wild flowers. But the work of one honored member, Eben H. Hitchings, has not been in vain. His faithfulness, his untiring industry, and his unquestioned knowledge have been, and will be, recognized by students of the pamphlet, who are by no means confined to Massachusetts nor, indeed, to the New England States. The expense drew most heavily on our appropriation, and at one time almost wrecked us financially, but the Committee have never regretted issuing it. It is now out of print.

While there have been most encouraging signs that the idea of teaching little children to raise and care for plants, in crowded city lanes and streets, could be carried out, it became evident to the Committee, that other work for children could be introduced into schools and homes, which would serve as good a purpose, and the results could be much more easily exhibited. Therefore a resolution to offer prizes for pressed flowers, ferns, and grasses was adopted. To stimulate the young people, quite large sums were offered for the best collections of each. This, it was hoped, would find many young pupils ready to attempt the work. To encourage them to begin, would possibly prove the first step towards success.

The Committee also believed that by this early training, the observing faculties of the children would be so educated in artistic forms, as seen in plants growing naturally, that the present tendency to exhibit in the public gardens of the country, flowers, or rather plants, from which all blossoms are sheared off, arranged in grotesque designs, would in time gradually disappear. The portraits of distinguished men; the symbols of trades; attempts to put spiritual suggestions into very material shapes; the plans of carpet gardening which drive the housekeeper frantic at seeing rolls of carpeting framed and left out in rain and sunshine—have run riot so long, that the Committee realized that but little could be done to displace them, except by educating the future superintendents of public grounds, denominated gardens and parks.

We admit that some men do not receive education, in the line of improvement, with cordiality. But something has been done in this line. In the neighborhood of Boston the superintendent of one of the largest cemeteries has wrought marvellous changes by relegating the horrid, glaring combinations of colors, to the unfrequented paths and substituting graceful shrubs and perennial plants with the happy result of a succession of flowers.

Visitors to the Columbian Exposition contrasted, with delight, the arrangement of beds, walks, and shruberies there, which were designed by Frederick Law Olmstead, a member of this Society, with crude plans at the Parks outside his special domain. But the crowds who gazed with pleasure at the latter numbered more in proportion, just as the throngs in pursuit of coarse entertainment, who delight in double-headed calves and no-armed men, are double the crowds at the florists' windows, which offer daily rich treats to those who cannot purchase.

The increasing quantity of flowers exposed for sale on the streets attests the growing love of flowers. On Saturday nights in summer, the throng on the sidewalk extends from Pemberton square to Howard street, hurrying to buy of the venders who crowd that locality, with their baskets of pinks, roses, pansies, etc., which they offer at low prices. They accompany the transfer with the marvellous assertion that "the freshness and fragrance will well repay the purchaser." What matter, if the fading rose takes with it the sentiment of the old, old story, and the young woman carries it off triumphantly, little heeding the drooping leaves? It answers to press for future enjoyment.

In presenting the report of a Public School Garden, we desire to emphasize the true idea of the school garden. The education which is supposed to result from planting, in military precision, rows of plants, replaced by others like magic, does not seem to the Committee to have any value. It can only be regarded as failing utterly in any educational line.

But growing plants, from the first sign of germination to the full perfection of blossom and fruit, and the edible roots in all stages, give constant opportunity for study. The everchanging condition becomes most interesting to the students, and teachers must observe, that while our leading colleges keep grown men at work, watching growth in feet and inches; also the power of growing cells to lift weights,—as was done at Amherst some years

ago — the active mind of a well balanced child, is also an exceedingly interesting field to cultivate.

Report on the George Putnam School Garden, Season of 1893.

The plants named below were introduced into the garden during the season of 1893:

Sanguinaria Canadensis.
Osmorrhiza longistylis.
Geranium maculatum.
Lysimachia quadrifolia.
Polygonatum biflorum.
Asclepias quadrifolia.
Polygala paucifolia.
Solidago arguta (2 clumps).
Solidago puberula (3 clumps).
Boltonia glastifolia.
Juniperus communis.
Aspidium Noveboracense.
Aspidium acrostichoides.
Asplenium Filix-fœmina.
Dicksonia punctilobula.
Osmunda regalis.
Botrychium lunarioides.
Clematis paniculata.

There are now eight varieties of hardy chrysanthemums in the garden, named as follows: Pearl Button, Lilliput Button, Brown Bob, Philip Pompon, Lucretia Crocker, George Putnam, Mrs. Wolcott, Chrys Parvus. The intention is to have a set of twelve, to be called the George Putnam set, and to propagate them sufficiently to obtain some revenue by their sale to schools or persons desiring such plants, the revenue to be devoted to the support of the garden. Two new varieties have been promised already.

The eight varieties named were exhibited at the regular fall Exhibition of Chrysanthemums, and given a gratuity of three dollars, to which more money was added, and the whole was expended for manure to fertilize the ground thoroughly. Previously, application had been made to the School Committee for manure, but, ostensibly in the interest of the strictest economy, the application was refused, although the city has manured the land but once in the history of the school, of more than a dozen years' duration. In view of this, the generous and unexpected gratuity of the Massachusetts Horticultural Society is fully appreciated by all interested in the school garden.

Golden rods and asters were planted under large ash trees in the corners of the garden, but the trees kept off the rain from a large

area, and their roots came close to the surface and exhausted the fertility of the soil to such a degree as to necessitate the removal of all the plants named, even *Aster corymbosus* and *A. macrophyllus*, which commonly grow under trees.

Not the least interesting are the plants that seem to have introduced themselves into the lawn of the garden in great abundance, enough to supply the whole school with plants for study. At one time dandelions abound, then violets, then cinquefoils. Whole classes go out in school hours and gather them for study, and the next year they will be as abundant as ever.

The intention is to have a good assortment of native ferns growing in the garden. Their study is to be facilitated by the use of lantern slides made from negatives of all the common species. The solar camera will enormously enlarge their images when thrown on the screen, and all their characteristic parts may be plainly seen by a whole class at once. Nine species are already in the garden, and some photographs of fronds have been taken.

The pods of the Scarlet Runner, the seeds of which were supplied by the Herbarium Committee, have furnished excellent material for the study of legumes, both in drawing and written description.

The third season of the garden closes with bright anticipations of the fourth.

HENRY L. CLAPP,

Principal of the George Putnam School.

The appended list of prizes tells the result of the examinations by members of the Committee, who faithfully attended to that duty. The Chairman pleads guilty to having been absent in another State until the display was ready for the exhibition.

Of that we can say that rarely could be found the work of school children — very often with little help — in better condition. The patience, industry, and enthusiasm shown should be recognized by teachers and friends.

The freshness of color of many flowers, and the subtle odor of roses and ferns which pervaded the hall, brought back the memories of summer strolls amid such things so vividly, that we became somewhat sentimental, and but little disposed to criticise even those sheets where the tips and toes of the specimens were

curling up for want of proper gumming material, or those where the specimens were strapped to their beds, like surgical cases in the hospital. A little less bandaging in one exhibit, a little more in another, would possibly have taken the pleasure of the Committee entirely away, because we do not expect to find experienced work among the children.

The whole area of the Lower Hall was used and a collection of one hundred and twenty-five specimens was to be seen in the Upper Hall.

The examiners were many, those interested in teaching being in the majority. Many of our members were there, but alas! many others were conspicuous by their absence; however, the loss in every case was theirs. Many who did examine went away with reports and pamphlets, ready to introduce this work in other places.

The following prizes and gratuities were awarded to children who exhibited Herbariums in Horticultural Hall, December 1 and 2, 1893:

GRASSES.— First prize for thirty specimens, Arthur C. Faxon	$3 00
FLOWERS.— Special prize for fifty additions, Phillips Barry	2 00
First prize for one hundred and twenty-five specimens, Arthur C. Boylston	5 00
Second prize for one hundred and twenty-five specimens, Mabel James	4 00
First prize for one hundred specimens, Elizabeth C. Dudley	4 00
First prize for fifty specimens, Nellie S. Morris	2 00
Second prize for fifty specimens, Lucy C. Lewis	1 50
First prize for twenty-five specimens, Mabel C. Macomber	1 50
LEAVES.— First prize for thirty-five sheets, Ethel M. Sargent	2 00
Second prize for thirty sheets, Mabel L. Trask	1 00
Third prize for twenty-nine sheets, Hannah B. Johnson	75
Amount of awards in prizes	$26 75

Gratuities: —

Mary B. Field, twenty-five flowering plants	$ 75
Ada K. Wood, thirty sheets of leaves	70
Kate A. Dwyer, twenty-four sheets	60
Rosamond Amos, twenty-five sheets	60
Athelstan Brandt, twenty-three sheets	60
Pauline Brandt, twenty-six sheets	60
Rosie M. Spenceley, twenty sheets	60
Lucy C. Lewis, twenty sheets	60
Arthur C. Faxon, collection of leaves	50
Amount of Gratuities	$5 55
Total awards	$32 30
School Gardens.— First prize, George Putnam School	$15 00
Total awards of all kinds,	$47 30

W. E. C. RICH,
Secretary.

The Committee desire to state for the benefit of the members of the Society that while the appropriation of $250 is asked for annually, about two-thirds of the sum only has been expended. It will be observed that the above report of awards does not equal the gratuities paid for common flowers in the weekly exhibitions of the Society, yet hundreds of children have been interested and educated.

Henrietta L. T. Wolcott,
Henry L. Clapp,
W. E. C. Rich,
Josephine L. Richards,
Committee on Window Gardening.

REPORT

TO THE

STATE BOARD OF AGRICULTURE.

FOR THE YEAR 1893.

By GEORGE CRUICKSHANKS, OF FITCHBURG.

The Massachusetts Horticultural Society began the year with a course of Lectures and Discussions on subjects of special interest to the horticulturist, by the following named speakers:

January 14. Village Improvement, by B. G. Northrop, LL.D., Clinton, Conn.

January 21. Landscape Gardening, by Warren H. Manning, Brookline.

January 28. Historical Sketch of English Horticulture, by Samuel Henshaw, West New Brighton, Staten Island, N. Y.

February 4. The Economics of Horticulture, by Hon. Henry L. Parker, Worcester.

February 11. Combatting the Fungous Diseases in Plants; Progress of the Work in the United States, by B. T. Galloway, Washington, D. C.

February 18. Wild Flowers and Ferns, by Mrs. P. D. Richards, West Medford.

February 25. The Carnation and its Culture, by Richard T. Lombard, Wayland.

March 4. Poisonous Plants, by Professor William P. Brooks, Amherst.

March 11. Aquatic Plants and Their Culture, by L. W. Goodell, Dwight.

March 18. Tuberous Rooted Begonias, by John G. Barker, Superintendent of Forest Hills Cemetery, Boston.

March 25. A Visit to Japan, by James Comley, Lexington.

These meetings are always well attended, and much interest is taken in both the lectures and the discussions which follow the

lectures. These are published in the TRANSACTIONS of the Society, which are free to all its members.

The sum appropriated for Prizes and Gratuities for 1893 was $7,850. Much is done by this Society to encourage the art of Horticulture, by offering liberal prizes for the best Vegetable Garden and best Fruit Garden; the best Vineyard and the best kept Greenhouse.

The Spring Exhibition opened March 21, and continued four days. The Lower Hall contained a fine show of early Vegetables, and Winter Apples and Pears. In the centre of the hall was a rich display of Azaleas, Genistas, and other plants in bloom. The great attraction was in the Upper Hall where were several choice collections of Spring Flowering Bulbs, which included the fragrant Hyacinths, Lilies of the Valley, Tulips, Narcissusses, Jonquils, Freesias, Polyanthuses, and Roman Hyacinths. On the platform the President of the Society exhibited a very choice collection of Orchids. On the tables in the centre of the hall were fine displays of Cinerarias, Cyclamens, Primulas, and Pansies.

The Rose and Strawberry Show opened June 22, for two days. The Roses were displayed in the Upper Hall and were up to the usual high standard of this Society. Besides the roses there were quantities of other flowers,— one collection of one hundred named varieties of Pæonies,— and very attractive displays of Gloxinias, Herbaceous Plants, and Hardy Flowering Shrubs. The show of Strawberries was excellent. New varieties are coming in and taking the places of some of the older sorts. The Marshall, a recent introduction, is taking the lead of all other varieties. Other prominent kinds were Bubach, Leader, and Jessie. The show of early Vegetables was fine.

The Annual Exhibition of Plants and Flowers began September 6, and continued two days. The chief attraction in the Lower Hall was a display occupying the entire platform. This collection comprised a very large variety of choice Roses, Hydrangeas, Phloxes, Asters, etc., backed with foliage of Cannas. Other cut flowers were Zinnias, Tuberous Begonias, Dahlias, Tropæolums, Marigolds, Petunias, Dianthus, Cannas, and Gladioli. The Upper Hall was filled with some of the finest flowering and ornamental leaved plants that the greenhouses in the vicinity of Boston could furnish, each exhibit being arranged under the immediate direction of the able Committee of Arrange-

ments, so as to produce the best effect. The collections of Ornamental Leaved Plants were very fine. They included Crotons, Dracænas, and Caladiums, with Palms, Tree Ferns, Adiantums, and Lycopodiums. A beautiful show of Aquatic Plants in two large tanks attracted much attention. In front of the platform were some fine bunches of Foreign Grapes; some of the bunches weighed between eight and nine pounds each.

The Annual Exhibition of Fruits and Vegetables began October 4, and continued two days. The choicest specimens from the garden and the orchard are placed on the tables of the Society at this gathering, and a finer display of fruit has never been made in Horticultural Hall. Many varieties of Apples and Pears were of the largest size. Gravenstein and Hubbardston Apples; Seckel, Bosc, and Sheldon Pears; Concord, Worden, and Delaware Grapes, were all of the best quality. The vegetables were shown in the Lower Hall. They were all well grown.

The Chrysanthemum Show opened November 7, and was held four days. This exhibition is looked forward to by all lovers of flowers as the crowning show of the year. This Society is noted for its splendid exhibitions of everything pertaining to Horticulture, but if it excels in any one line, it is the Chrysanthemum. The introduction of this flower into Europe dates from the latter part of the last century. The first seedling raised in Europe was produced in 1827 — sixty-six years ago. The Japanese varieties that are so much admired now, were not known here until 1860. What a change! and it could all be seen at the Chrysanthemum Show of 1893. In Japan this is, and long has been, the national flower. There it is used as a royal seal, and the highest order in that kingdom is the Order of the Chrysanthemum.

The Upper Hall was devoted to the pot-plants. One exhibit, of one hundred varieties, included all the different colors; the pure white, yellow from the palest straw to the deepest old gold, purple, pink, rose, and carmine. All the classes were represented by well grown specimens, with an abundance of clean healthy foliage. In the Lower Hall the cut blooms were arranged. The variety of color, the size and form of the flowers, the great number of seedlings seen for the first time, many of them showing new combinations of color, with fine healthy foliage, together formed an exhibition of beauty and brilliancy beyond description.

GEORGE CRUICKSHANKS, *Delegate.*

REPORT

OF THE

COMMITTEE ON THE LIBRARY,

FOR THE YEAR 1893.

As far as the concerns of the Library go, the year which is now drawing to its close has been much like its predecessors; the Society's regular appropriation has been expended for the usual magazines and binding; the Card Catalogue of Plates has made progress, though not as much as in some years; the income of the Stickney Fund has continued to draw the best botanical and horticultural works to this room, and the extra appropriation of one hundred dollars for binding has enabled much of the accumulated matter to be properly bound and prepared for consultation.

It is desirable that attention should be called to the value of the ever increasing mass of reports of the experiment stations of all parts of the country. The majority of these are of very great importance, especially those which treat of fungoid and other maladies of plants. The national government publishes a review of all of these from time to time.

Mention has occasionally been made that we have reached the limit of our space, and that the objectionable practice of putting books out of sight behind others had for some time been necessary. As may be seen from the Librarian's reports the material acquired by gift or exchange equals in amount that which we purchase from the income of the Stickney Fund so that, even if the latter source of supply were to be taken from us now instead of continuing for five years more, the need of further

space would still be a pressing one. The best way to meet this, as it seems to us, is to build a gallery around the librarian's room similar to that in this room and to place bookcases therein. This will not afford as much space as needed, it is true, but still enough to alleviate the pressure very much.

Last year this Committee stated that the time had almost come when we should be obliged to ask for this additional space; we now say that the time has fully arrived and we accordingly request that a committee be appointed to obtain an estimate of the cost and to report at the earliest opportunity.

For the Committee,

W. E. ENDICOTT,

Chairman.

If the arrangement of previous TRANSACTIONS were kept up, the list of Library Accessions would here follow the Report of the Committee on the Library, but so much time is unavoidably required to prepare this list that in order to avoid delaying the printing of the TRANSACTIONS, the Committee on Publication have directed that it be placed at the end of the book.

REPORT

OF THE

SECRETARY AND LIBRARIAN,

FOR THE YEAR 1893.

Little can be said in these departments to vary this report from those of preceding years. The same gradual growth which has been recorded in reports of previous years has occurred in that now closing. The work of editing and printing the TRANSACTIONS has been pushed to completion as rapidly and early as possible, but the disabling for two or three months of the person employed to assist therein was an unfortunate interference with the rapid progress of the work. The list of Library Accessions during the year 1892, it will be noticed, occupies forty-five pages instead of twenty-seven as in 1891. This list requires much labor and care in preparation to ensure accuracy — more than any other portion of the TRANSACTIONS — and the great increase in length noted, added materially to the time required to edit and print the work. This list would of itself in point of size form a respectable catalogue; indeed it is larger than the catalogues of many public town libraries, and it is beyond comparison more difficult to prepare, but it may be considered as forming an Annual Supplement to the Library Catalogue and therefore no pains have been spared in its preparation to ensure fulness and accuracy.

The record of books added to the Library in 1893 is not as long as that of 1892, but it shows an increase of nearly fifty per cent over that of 1891. The great number of additions to the Library has prevented as much progress in the verification and arrangement of the Card Catalogue of books as was desirable, but the work has not been overlooked. All the cards which had been written for the Card Catalogues of Plates have been arranged,

and are now available for finding the plates indexed thereon. Besides these two Card Catalogues there has this year been added a Card Catalogue, arranged by subjects, of the Literature of Experiment Stations and Kindred Institutions, prepared at the Office of Experiment Stations, and published by authority of the Secretary of Agriculture. For this Catalogue we are indebted to President Goodell, of the State Agricultural College, and for this service, and also for valuable assistance in collecting the publications of Experiment Stations throughout the country he is justly entitled to the thanks of the Society.

Among the noteworthy books added to the Library this year may be mentioned the fifth volume of Sargent's Silva of North America; the Flora Batava in eighteen volumes; Savi's Flora Italiana, in three folio volumes; Moris's Flora Sardoa; the completion of Willkomm's Flora of Spain and the Balearic Islands; the Annals of the Royal Botanic Garden of Calcutta; Reichenbach's Xenia Orchidacea; Kraft's Pomona Austriaca, in two folio volumes, supplying the greatest desideratum in this department, and two Dutch works on Pomology; all these books being illustrated with instructive plates, most of which are colored. A copy of Brunfels's Herbarium, illustrated with woodcuts, published at Strasburg, 1532–1536, which has been purchased, is the oldest book in the Library, the most ancient that we previously possessed being Fuchsius's Historia Stirpium, published in 1542. As showing the wide range of our acquisitions I may mention a set of the Jornal de Horticultura Pratica, in twenty-two volumes, published at Oporto, Portugal, and the publications of the Norway Horticultural Society, which have been received from the Secretary in exchange for our own TRANSACTIONS, and which, though they can be read by few persons here, are at least interesting as informing us of the existence of a horticultural society in that far northern country. Two South American Agricultural journals, published by the Asociacion Rural del Uruguay, and the Sociedad Rural Argentina, have for some years been received from those associations, and this year there has been added to our exchange list the name of a journal published on the opposite side of the Southern Hemisphere, the Agricultural Gazette of New South Wales.

The old question, where to put the books added to the Library is again upon us. Often it is a great perplexity, and sometimes

an utter impossibility to find an appropriate place for them. There are books now waiting to go on the shelves for which there is absolutely no proper place.

The many sets of journals, etc., purchased during the last few years have added largely to the number of books requiring to be bound. Though the additional appropriation made for this purpose has all been expended, a large number of both are still waiting to be bound. These series of journals, etc., and their binding have added largely to the work here, for the arrangement of books of the character of most of ours cannot be intrusted to the binder, and no book is ever sent to him until it is arranged exactly as we wish to have it bound. Oftentimes this is a work of much perplexity and one requiring careful study.

ROBERT MANNING,

Secretary and Librarian.

TREASURER'S REPORT

FOR THE YEAR 1893.

MASSACHUSETTS HORTICULTURAL SOCIETY *in account current to December 31, 1893, with* CHARLES E. RICHARDSON, *Treasurer.*

1893.	DR.		
Dec. 31.	To amount paid on account of the Library during 1893, viz.:		
	For books, periodicals, and binding .	$404 50	
	From income of Stickney Fund, expended for books	700 00	
			$1,104 50
	To amount paid for Furniture and Exhibition ware		868 72
	To Interest on Funds for Prizes, credited below		1,892 72
	To Prizes awarded in 1892, paid in 1893, as follows:		
	For Plants	$1,847 15	
	" Flowers	2,025 63	
	" Fruit	1,622 40	
	" Vegetables	980 40	
	" Gardens and Greenhouses . .	290 00	
	" Hunnewell Prizes for Rhododendrons	105 00	
			6,870 58
	To amount paid Special Prize, Miss R. Simpkins		42 00
	" " on Window Gardening Committee account, 1892 .		44 25
	" " on Window Gardening Committee account, 1893 .		117 45
	" " Salaries of Secretary and Assistant and Treasurer .	$3,600 00	
	" " Salaries of members of Committees	940 00	
	" " Extra services in Library .	883 50	
	" " for Card Catalogue of Plates	49 99	
	" " on account of Committee on Publication and Discussion	250 00	
Amounts carried over, ...		$5,723 49	$10,440 22

Amounts brought over,		$5,723 49	$10,440 22
To amount paid for Heating		536 60	
" " Labor, including Janitor and Fireman		2,319 15	
" " Taxes for 1893		2,560 00	
" " Insurance		1,230 00	
" " City Water Rates		148 04	
" " Repairs		319 74	
" " Lighting		1,045 13	
" " Incidentals		607 02	
" " Stationery, Printing, and Postage		2,362 44	
" " Committee of Arrangements		400 60	
" " World's Columbian Exhibition		2 65	
			17,254 86
Total Payments of 1893			$27,695 08
Balance of Cash on hand, December 31, 1893			17,689 79
			$45,384 87

1893.	Cr.		
Jan. 1.	By Balance of account rendered December 31, 1892		$12,417 19
	By Income from Building in 1893:		
	Rent of Stores	$17,470 85	
	" Halls	6,195 00	
		$23,665 85	
	By Income from Mount Auburn Cemetery	3,426 79	
	" Received Massachusetts State Bounty	600 00	
	" " Annual Exhibitions, gross receipts	$1,664 00	
	Less Expenses	569 15	
		1,094 85	
	" " from Admissions and Assessments	1,142 00	
	" Interest received on Bonds	$705 00	
	" " " on Deposit in Bank	214 10	
	" " " from all other sources	57 37	
		976 47	
	" Received from Edward Hatch, Special Prize awarded 1893	50 00	
	" " " Miss R. Simpkins, Special Prize awarded 1893	42 00	
Amounts carried over,		$30,997 96	$12,417 19

Amounts brought over, ...		$30,997 96	$12,417 19
By received from sale of History . .		2 50	
" " " " Transactions, .		5 00	
" " " " Duplicate book	$2 00		
" " " E. C. R. Walker, for purchase of a library book	2 50		
		4 50	
" " " H. H. Hunnewell, his prizes for 1892 . .		65 00	
" Interest credited to the following Funds against charges above:			
Samuel Appleton Fund, $1,000, at 5%	$50 00		
John A. Lowell Fund, $1,000, at 5%	50 00		
Theodore Lyman Fund, $11,000, at 5%	550 00		
Josiah Bradlee Fund, $1,000, at 5%	50 00		
Benjamin V. French Fund, $500, at 5%	25 00		
H. H. Hunnewell Fund, $4,000, at 5%	200 00		
William J. Walker Fund, $2,354.43, at 5%	117 72		
Levi Whitcomb Fund, $500, at 5%	25 00		
Benjamin B. Davis Fund, $500, at 5%	25 00		
Marshall P. Wilder Fund, $1,000, at 5%	50 00		
John Lewis Russell Fund, $1,000, at 5%	50 00		
Josiah Stickney Fund, $12,000, amount	700 00		
		1,892 72	
			$32,967 68
			$45,384 87

E. & O. E.

CHARLES E. RICHARDSON, *Treasurer.*

BOSTON, December 31, 1893.

Audited and approved,

H. H. HUNNEWELL,
NATHANIEL T. KIDDER,
A. HEMENWAY,
} *Finance Committee.*

ASSETS AND LIABILITIES OF THE MASSACHUSETTS HORTICULTURAL SOCIETY,

DECEMBER 31, 1893.

ASSETS.

Real Estate		$250,000 00	
Furniture and Exhibition Ware		6,608 46	
Stereotype Plates and copies of History		262 00	
Library		32,697 46	
Chicago, Burlington & Quincy R. R. Bonds, 7%		1,500 00	
Kansas City, Clinton & Springfield R. R. Bonds, 5%		1,980 00	
Sinking Fund, General Electric Company's Bonds, 5%		10,000 00	
A. K. Loring		359 41	
Committee of Arrangements		60	
Cash		17,689 79	
			$321,097 72

LIABILITIES.

Mortgage		$1,000 00	
Josiah Stickney Fund, payable to Harvard College, 1899		12,000 00	
Prize Funds, invested in the Building, viz.:			
Samuel Appleton Fund,	$1,000 00		
John A. Lowell "	1,000 00		
Theodore Lyman "	11,000 00		
Josiah Bradlee "	1,000 00		
Benjamin V. French "	500 00		
H. H. Hunnewell "	2,500 00		
William J. Walker "	2,354 43		
Levi Whitcomb "	500 00		
Benjamin B. Davis "	500 00		
	$20,354 43		
Prize Funds invested in Bonds:			
H. H. Hunnewell Fund,	$1,500 00		
Marshall P. Wilder "	1,000 00		
John Lewis Russell "	1,000 00		
	3,500 00		
		23,854 43	
Edward Hatch Special Prize, due and unpaid		50 00	
Prizes for 1893, due and unpaid		7,850 00	
			$44,754 43
			$276,343 29

CHARLES E. RICHARDSON, *Treasurer.*

MEMBERSHIP ACCOUNT, MASSACHUSETTS HORTICULTURAL SOCIETY,

DECEMBER 31, 1893.

Number of Life Members per last report	549		
Added during 1893	16		
Commuted from Annual	5		
		570	
Deceased		13	
			557
Number of Annual Members per last report	234		
Added during 1893	14		
		248	
Commuted to Life Membership	5		
Deceased	6		
Dropped by request	4		
" for non-payment for two years	1		
		16	
			232
Present membership			789

INCOME FROM MEMBERSHIP.

16 new Life Members, @ $30	$480 00
5 commuted to Life, @ $20	100 00
14 new Annual Members, @ $10	140 00
Assessments	422 00
	$1,142 00

CHARLES E. RICHARDSON, *Treasurer.*

Dr. *Massachusetts Horticultural Society in account with the Proprietors of the Cemetery of Mt. Auburn.* **Cr.**

For Sales and Improvements within the Cemetery for the year ending December 31, 1893.

To cost of filling up and improving land at Mt. Auburn for the year ending December 31, 1893, the Massachusetts Horticultural Society being charged with their proportion of the same:			By sales in January	$15 00
Birch, to Eagle and Cherry Avenues	$1,030 69		" " February	15 00
Larch Avenue	200 63		" " March	50 00
	$1,231 32		" " April	765 00
			" " May	3,568 00
One quarter of $1,231.32	$307 83		" " June	3,606 00
Balance due Mass. Horticultural Society	3,426 79		" " July	1,960 00
	$3,734 62		" " August	1,305 00
			" " September	635 00
			" " October	840 00
			" " November	2,687 50
			" " December	160 00
				$15,606 50
			Net amount received from Receiving Tomb	782 00
				$16,388 50
			Less Graves repurchased	50 00
				$16,338 50
			Deduct for Annual Expenses	1,400 00
				$14,938 50
	$3,734 62		Mass. Horticultural Society ¼ part of $14,938.50	$3,734 62½

E. & O. E.

H. B. MACKINTOSH, *Treasurer.*

December 31, 1893.

THE MASSACHUSETTS HORTICULTURAL SOCIETY

To the PROPRIETORS OF THE CEMETERY OF MOUNT AUBURN, *Dr.*

For one-fourth part of the following Expenditures, for grading new lands for sale during the year 1893:

Birch to Eagle and Cherry Avenues.

408½ days, men	$919 13	
29¾ days, man and horse	111 56	
		$1,030 69

Larch Avenue (near Maple Avenue).

50 days, men	$112 50	
23½ days, man and horse	88 13	
		$200 63
		$1,231 32
One-fourth of $1,231.32 is		$307 83

MOUNT AUBURN, December 31, 1893.

J. W. LOVERING,
Supt. of the Cemetery of Mount Auburn.

I certify the foregoing to be a true copy of improvements for the year 1893, rendered by the Superintendent.

H. B. MACKINTOSH,
Treasurer.

Massachusetts Horticultural Society.

OFFICERS AND STANDING COMMITTEES FOR 1894.

President.

NATHANIEL T. KIDDER, of Milton.

Vice-Presidents.

CHARLES H. B. BRECK, of Brighton. FRANCIS H. APPLETON, of Peabody.
CHARLES S. SARGENT, of Brookline. AUGUSTUS PARKER, of Roxbury.

Treasurer and Superintendent of the Building.

CHARLES E. RICHARDSON, of Cambridge.

Secretary and Librarian.

ROBERT MANNING, of Salem.*

Professor of Botany and Vegetable Physiology.

CHARLES S. SARGENT, of Brookline.

Professor of Entomology.

SAMUEL H. SCUDDER, of Cambridge.

Delegate to the State Board of Agriculture.

E. W. WOOD, of West Newton.

Delegate to the Board of Control of the State Agricultural Experiment Station.

WILLIAM C. STRONG, of Waban.

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*Communications to the Secretary, on the business of the Society, should be addressed to him at Horticultural Hall, Boston.

Standing Committees.

Executive.

THE PRESIDENT, NATHANIEL T. KIDDER, CHAIRMAN.
THE CHAIRMAN OF THE FINANCE COMMITTEE, H. H. HUNNEWELL, *Ex officio.*
WILLIAM C. STRONG. BENJAMIN C. CLARK.
CHARLES H. B. BRECK. FRANCIS H. APPLETON.
WILLIAM H. SPOONER. WALTER HUNNEWELL.
HON. J. R. LEESON.

Finance.

H. HOLLIS HUNNEWELL, OF BOSTON, CHAIRMAN.
NATHANIEL T. KIDDER. AUGUSTUS HEMENWAY.

Publication and Discussion.

J. D. W. FRENCH, OF BOSTON, CHAIRMAN.
C. MINOT WELD. BENJAMIN M. WATSON, JR.

For Establishing Prizes.

CHAIRMAN OF COMMITTEE ON FRUITS, CHAIRMAN.
CHAIRMEN OF THE COMMITTEES ON PLANTS, FLOWERS, VEGETABLES, AND GARDENS, *Ex officiis.*
CHARLES M. ATKINSON. J. WOODWARD MANNING, JR.

Library.

WILLIAM E. ENDICOTT, OF CANTON, CHAIRMAN.
THE PROFESSOR OF BOTANY AND VEGETABLE PHYSIOLOGY, AND THE PROFESSOR OF ENTOMOLOGY, *Ex officiis.*
J. D. W. FRENCH. EDWIN FAXON.
GEORGE W. HUMPHREY. WILLIAM J. STEWART.

Gardens.

JOHN G. BARKER, OF JAMAICA PLAIN, CHAIRMAN.
CHAIRMEN OF THE COMMITTEES ON PLANTS, FLOWERS, FRUITS, AND VEGETABLES, *Ex officiis.*
HENRY W. WILSON. JACKSON DAWSON.

Plants.

DAVID ALLAN, OF CLIFTONDALE, CHAIRMAN.
JAMES COMLEY. WILLIAM ROBINSON.
A. C. BOWDITCH. JAMES WHEELER.

Flowers.

ARTHUR H. FEWKES, of Newton Highlands, Chairman.

MICHAEL H. NORTON. J. WOODWARD MANNING, Jr.
WILLIAM J. MARTIN. ELIJAH A. WOOD.

Fruits.

E. W. WOOD, of West Newton, Chairman.

BENJAMIN G. SMITH. O. B. HADWEN. SAMUEL HARTWELL.
CHARLES F. CURTIS. WARREN FENNO. J. WILLARD HILL.

Vegetables.

CHARLES N. BRACKETT, of Newton, Chairman.

CEPHAS H. BRACKETT. VARNUM FROST. WARREN H. HEUSTIS.
P. G. HANSON. JOHN C. HOVEY. WILLIAM H. HUNT.

Committee of Arrangements.

JOSEPH H. WOODFORD, of Boston, Chairman.

CHAIRMEN OF THE COMMITTEES ON PLANTS, FLOWERS, FRUITS, VEGETABLES, AND GARDENS, *Ex officiis*.

ROBERT FARQUHAR.

MEMBERS FOR LIFE.

Members of the Society and all other persons who may know of deaths, changes in residence, or other circumstances showing that the following list is inaccurate in any particular, will confer a favor by promptly communicating to the Secretary the needed corrections.

Information, or any clew to it, is especially desired in regard to members whose names are marked thus †.

Adams, Luther, Brighton.
Albro, Charles, Taunton.
Alger, Rev. R. F., Becket.
Allan, David, Cliftondale.
Ames, Frank M., Canton.
Ames, George, Boston.
Ames, Hon. Oliver, Boston.
Ames, Preston Adams, Boston.
Amory, Charles, Boston.
Amory, Frederick, Boston.
Andrews, Charles L., Milton.
Andrews, Frank W., Washington, D. C.
Andros, Milton, San Francisco, Cal.
Appleton, Edward, Reading.
Appleton, Francis H., Peabody.
Appleton, William S., Boston.
Atkins, Edwin F., Belmont.
Avery, Hon. Edward, Boston.
Ayling, Isaac, M. D., Brookline.

Bancroft, John C., Boston.
Banfield, Francis L., M. D., Worcester.
Barber, J. Wesley, Newton.
Barnard, James M., Malden.
Barnard, Robert M., Everett.
Barnes, Walter S., Somerville.
Barnes, William H. Boston.
†Barney, Levi C., Boston.
Barratt, James, East Pasadena, Cal.
Barrett, Edwin S., Concord.
Barry, William C., Rochester, N. Y.
Bartlett, Edmund, Newburyport.
Bates, Hon. Amos, Hingham.
Beal, Leander, Boston.
Becker, Frederick C., Cambridge.
Beckford, Daniel R., Jr., Dedham.
Beebe, Franklin H., Boston.
Berry, James, Brookline.
Birchard, Charles, Framingham.
Black, James W., Cambridge.
Blake, Francis, Weston.
Blakemore, John E., Roslindale.
Blanchard, John W., Dorchester.
Blaney, Henry, Salem.
Blinn, Richard D., Chicago, Ill.
Bliss, William, Boston.
Bocher, Prof. Ferdinand, Cambridge.
Bockus, Charles E., Dorchester.
†Botume, John, Wyoming.
Bouvé, Thomas T., Boston.
Bowditch, Azell C., Somerville.
Bowditch, Charles P., Jamaica Plain.
Bowditch, James H., Brookline.
Bowditch, William E., Roxbury.
Bowker, William H., Boston.
Brackett, Cephas H., Brighton.
Brackett, Charles N., Newton.
Bresee, Albert, Hubbardton, Vt.
Brewer, Francis W., Hingham.
†Brigham, William T., Boston.
Brimmer, Martin, Boston.
Brooks, J. Henry, Milton.

Brown, Alfred S., Jamaica Plain.
Brown, Charles E., Yarmouth, N. S.
Brown, Edward J., Weston.
Brown, George Barnard, Brookline.
Brown, George Bruce, Framingham.
Brown, Jacob, Woburn.
Bruce, Nathaniel F., Billerica.
Bullard, John R., Dedham.
Bullard, William S., Boston.
Burnett, Joseph, Southborough.
Burr, Fearing, Hingham.
Burr, Matthew H., Hingham.
Buswell, Edwin W., Brooklyn, N. Y.
Buswell, Frank E., Brooklyn, N. Y.
Butler, Aaron, Wakefield.
Butler, Edward K., Jamaica Plain.
Butterfield, William P., East Lexington.

Cabot, Edward C., Brookline.
Cadness, John, Flushing, N. Y.
Cains, William, South Boston.
Calder, Augustus P., Boston.
Campbell, Francis, Cambridge.
Capen, John, Boston.
Carlton, Samuel A., Boston.
Carr, Hon. John, Roxbury.
†Carruth, Charles, Boston.
Carter, Charles N., Boston.
Carter, Miss Maria E., Woburn.
Cartwright, George, Dedham.
Chadbourne, Marshall W., Mount Auburn.
Chamberlain, Chauncey W., Boston.
Chase, Andrew J., Lynn.
Chase, Daniel E., Somerville.
†Chase, George B., Boston.
Chase, William M., Baltimore, Md.
Cheney, Benjamin P., Boston.
Child, Francis J., Cambridge.
Childs, Nathaniel R., Boston.
Choate, Charles F., Cambridge.
Claflin, Hon. William, Newtonville.
Clapp, Edward B., Dorchester.
Clapp, James H., Dorchester.
Clapp, William C., Dorchester.
Clark, Benjamin C., Boston.
Clark, J. Warren, Rockville.
Clarke, Miss Cora H., Jamaica Plain.
Cleary, Lawrence, West Roxbury.
Clement, Asa, Dracut.
Cobb, Albert A., Brookline.
Coburn, Isaac E., Everett.
Codman, James M., Brookline.
Codman, Ogden, Lincoln.
Coffin, G. Winthrop, West Roxbury.
Coffin, William E., Dorchester.
Collamore, Miss Helen, Boston.
Converse, Elisha S., Malden.
Converse, Parker L., Woburn.
Coolidge, Joshua, Mount Auburn.
Copeland, Franklin, West Dedham.
Cottle, Henry C., Boston.
Cowing, Walter H., West Roxbury.
Cox, Thomas A., Dorchester.
Coy, Samuel I., Boston.
Crawford, Dr. Sarah M., Roxbury.
Crocker, Miss S. H., Boston.
Crosby, George E., West Medford.
†Crowell, Randall H., Chelsea.
Cummings, Hon. John, Woburn.
Curtis, Charles F., Jamaica Plain.
Curtis, George S., Jamaica Plain.
Cushing, Robert M., Boston.

†Daggett, Henry C., Boston.
Damon, Samuel G., Arlington.
Dana, Charles B., Wellesley.
Davenport, Albert M., Watertown.
Davenport, Edward, Dorchester.
Davenport, George E., Medford.
Davenport, Henry, New York.
Davis, John, Lowell.
Dawson, Jackson, Jamaica Plain.
Day, William F., Roxbury.
Dee, Thomas W., Mount Auburn.
Denny, Clarence H., Boston.
Denton, Eben, Dorchester.
Dewson, Francis A., Newtonville.
Dexter, F. Gordon, Boston.
Dickerman, George H., Somerville.
Dike, Charles C., Stoneham.
Dorr, George, Dorchester.

Dove, George W. W., Andover.
Dowse, William B. H., W. Newton.
Durant, William, Boston.
Durfee, George B., Fall River.
Dutcher, Frank J., Hopedale.

Eaton, Horace, Cambridge.
Edgar, William W., Waverly.
†Eldridge, E. H., Roxbury.
Eliot, Charles, Milton.
Ellicott, Joseph P., Boston.
Elliot, Mrs. John W., Boston.
Elliott, William H., Brighton.
Endicott, William E., Canton.
Everett, William, Dorchester.
Ewell, Warren, Dorchester.

Fairchild, Charles, Boston.
Falconer, William, Glencove, N. Y.
Farlow, Lewis H., Newton.
Farquhar, James F. M., Roslindale.
Farquhar, John K. M. L., Roxbury.
Farquhar, Robert, Boston.
Faxon, John, Quincy.
Fenno, J. Brooks, Boston.
Fewkes, Arthur H., Newton Highlands.
Finlayson, Kenneth, Brookline.
Fisher, David, Montvale.
Fisher, James, Roxbury.
†Fisher, Warren, Boston.
Flagg, Augustus, Boston.
Fleming, Edwin, West Newton.
Fletcher, George V., Belmont.
Fletcher, J. Henry, Belmont.
Fletcher, John W., Chelsea.
Flint, David B., Boston.
Flynt, William N., Monson.
Forster, Edward J., M. D., Boston.
Foster, Francis C., Cambridge.
Fottler, John, Jr., Dorchester.
Fowle, George W., Jamaica Plain.
Fowle, William B., Auburndale.
French, J. D. Williams, Boston.
French, Jonathan, Boston.
French, S. Waldo, Parley Vale.
French, W. Clifford, Boston.

Galloupe, Charles W., Swampscott.
Galvin, John, Boston.
†Gardner, Henry N., Mount Auburn.
Gardner, John L., Brookline.
Gibbs, Wolcott, M. D., Newport, R. I.
Gill, George B., Medford.
Gillard, William, Boston.
Gilmore, E. W., North Easton.
Gilson, F. Howard, Reading.
Glover, Albert, Boston.
Glover, Joseph B., Boston.
Goddard, A. Warren, Brookline.
Goddard, Joseph, Roxbury.
Goddard, Mrs. Mary T., Newton.
Goodell, L. W., Dwight.
Gorham, James L., Jamaica Plain.
†Gould, Samuel, Boston.
Gowing, Mrs. Clara E., Boston.
Gray, James, Wellesley.
Gregory, Hon. James J. H., Marblehead.
Greig, George, Toronto, Ontario.
Grey, Benjamin, Malden.
Guild, J. Anson, Brookline.

Hadwen, Obadiah B., Worcester.
Hall, Edwin A., Cambridgeport.
Hall, George A., Chelsea.
Hall, George R., Fort George, Fla.
†Hall, John R., Roxbury.
Hall, Lewis, Cambridge.
Hall, Stephen A., Revere.
Hall, William F., Brookline.
Halliday, William H., South Boston.
Hammond, Gardiner G., New London, Conn.
Hammond, George W., Boston.
Hammond, Samuel, Boston.
Hanson, P. G., Woburn.
†Harding, George W., Arlington.
Harding, Louis B., Stamford, Conn.
Hardy, F. D., Cambridgeport.
Harrington, Nathan D., Somerville.
Harris, Charles, Cambridge.
Harris, Thaddeus William, A. M., Cambridge.
Hart, William T., Boston.
Hastings, Levi W., Brookline.

Hathaway, Seth W., Marblehead.
Hawken, Mrs. Thomas, Rockland, Maine.
Hayes, Daniel F., Exeter, N. H.
Hayes, Francis Brown, Lexington.
†Hazeltine, Hazen, Boston.
Hemenway, Augustus, Canton.
Henshaw, Joseph P. B., Boston.
Heywood, Hon. George, Concord.
Hilbourn, A. J., Boston.
Hill, John, Stoneham.
Hittinger, Jacob, Mount Auburn.
Hoar, Samuel, Concord.
Hodgkins, John E., Newcastle, N. H.
Hollis, George W., Grantville.
Hollis, John W., Allston.
Holmes, Edward J., Boston.
Holt, Mrs. Stephen A., Winchester.
Hooper, Thomas, Bridgewater.
Horner, Mrs. Charlotte N. S., Georgetown.
Horsford, Miss Kate, Cambridge.
Hovey, Charles H., East Pasadena, Cal.
Hovey, John C., Cambridgeport.
Hovey, Stillman S., Woburn.
Hubbard, Charles T., Weston.
Hubbard, Gardner G., Washington, D. C.
Hubbard, James C., Everett.
Humphrey, George W., Dedham.
Hunnewell, Arthur, Wellesley.
Hunnewell, Henry Sargent, Wellesley.
Hunnewell, H. Hollis, Wellesley.
Hunnewell, Walter, Wellesley.
Hunt, Dudley F., Reading.
Hunt, Francis W., Melrose.
Hunt, Franklin, Boston.
Hunt, William H., Concord.
Hyde, James F. C., Newton Highlands.

Jack, John George, Jamaica Plain.
Jackson, Charles L., Cambridge.
Jackson, Robert T., Dorchester.
Janvrin, William S., Revere.
Jeffries, John, Boston.
Jenks, Charles W., Boston.
Johnson, J. Frank, Boston.
Jose, Edwin H., Cambridgeport.
Joyce, Mrs. E. S., Medford.

Kakas, Edward, West Medford.
Kelly, George B., Jamaica Plain.
Kendall, D. S., Woodstock, Ont.
Kendall, Edward, Cambridgeport.
†Kendall, Joseph R., San Francisco, Cal.
Kendall, Dr. Walter G., Atlantic.
Kendrick, Mrs. H. P., Allston.
Kennard, Charles W., Boston.
Kennedy, George G., M. D., Milton.
Kent, John, Brookline.
†Keyes, E. W., Denver, Col.
Keyes, George, Concord.
Keyes, John M., Concord.
Kidder, Charles A., Southborough.
Kidder, Nathaniel T., Milton.
†Kimball, A. P., Boston.
King, Franklin, Dorchester.
Kingman, Abner A., Brookline.
Kingman, C. D., Middleborough.
Kinney, John M., Boston.
Knapp, Walter H., Newtonville.

Lancaster, Charles B., Newton.
Lawrence, James, Groton.
Lawrence, John, Groton.
Learned, Charles A., Arlington.
Lee, Charles J., Dorchester.
Lee, Henry, Boston.
Leeson, Hon. Joseph R., Newton Centre.
Lemme, Frederick, North Cambridge.
Leuchars, Robert B., Boston.
Lewis, A. S., Framingham.
Lewis, William G., Framingham.
Lincoln, George, Hingham.
Lincoln, Col. Solomon, Boston.
Little, James L., Brookline.
Lockwood, Rhodes, Boston.
Lodge, Richard W., Swampscott.
Loftus, John P., Dorchester.

Loring, Caleb W., Beverly Farms.
Lovett, George L., West Newton.
†Lowder, John, Watertown.
Lowell, Augustus, Boston.
Luke, Elijah H., Cambridgeport.
Lumb, William, Boston.
Lyman, Col. Theodore, Brookline.
Lyon, Henry, M. D., Charlestown.

†Mahoney, John, Boston.
Mallet, E. B., Jr., Freeport, Maine.
Mann, James F., Ipswich.
Manning, Jacob W., Reading.
Manning, Mrs. Lydia B., Reading.
Manning, Robert, Salem.
Manning, Warren H., Brookline.
Marshall, Frederick F., Chelsea.
Martin, John S., Roxbury.
Matthews, Nathan, Boston.
McCarty, Timothy, Providence, R. I.
McClure, John, Revere.
McWilliam, George, Whitinsville.
Melvin, James C., West Newton.
Merriam, Herbert, Weston.
Merriam, M. H., Lexington.
Merrifield, William T., Worcester.
Merrill, Hon. Moody, Roxbury.
Metivier, James, Cambridge.
Milmore, Mrs. Joseph, Newton Lower Falls.
Minton, James, Boston.
Monteith, David, Dedham.
Moore, John H., Concord.
†Morse, Samuel F., Boston.
Motley, Thomas, Jamaica Plain.
Mudge, George A., Portsmouth, N. H.
†Munroe, Otis, Boston.

Needham, Daniel, Groton.
Nevins, David, Framingham.
Newman, John R., Winchester.
Newton, Rev. William W., Pittsfield.
Nickerson, George A., Dedham.
Norton, Charles W., Allston.

Oakman, Hiram A., North Marshfield.
Olmsted, John Charles, Brookline.

Packer, Charles H., Boston.
Paige, Clifton H., Mattapan.
Paige, John C., Boston.
Palmer, Julius A., Jr., Boston.
Parker, Augustus, Roxbury.
Parker, Charles W., Boston.
Parker, Miss Sarah, Roxbury.
Partridge, Horace, North Cambridge.
Paul, Alfred W., Dighton.
Peabody, Francis H., Boston.
Peabody, John E., Boston.
Peabody, Col. Oliver W., Milton.
Pearce, John, West Roxbury.
Peck, O. H., Denver, Col.
Peck, William G., Arlington.
Peirce, Silas, Boston.
Penniman, A. P., Waltham.
Perkins, Edward N., Jamaica Plain.
†Perry, George W., Malden.
Philbrick, William D., Newton Centre.
Pierce, Dean, Brookline.
Pierce, George Francis, Dorchester.
Pierce, Henry L., Boston.
Pierce, Samuel B., Dorchester.
Poor, John R., Boston.
Porter, Herbert, Malden.
Porter, James C., Wollaston.
†Potter, Joseph S., Arlington.
Prang, Louis, Roxbury.
Pratt, Laban, Dorchester.
Pratt, Lucius G., West Newton.
Pratt, Robert M., Boston.
Pratt, William, Winchester.
Pray, Dr. Mark W., Boston.
†Prescott, Eben C., Boston.
Prescott, William G., East Pepperell.
Prescott, William G., Quincy.
Pringle, Cyrus G., Charlotte, Vt.
Proctor, Thomas P., Jamaica Plain.
Prouty, Gardner, Littleton.
Putnam, Joshua H., Brookline.

Quinby, Hosea M., M. D., Worcester.

Raddin, Everett W., North Cambridge.
Rand, Miss Elizabeth L., Newton Highlands.
Rand, Harry S., North Cambridge.
Rand, Oliver J., Cambridgeport.
Rawson, Warren W., Arlington.
Ray, James F., Franklin.
Ray, Hon. James P., Franklin.
Ray, Hon. Joseph G., Franklin.
Raymond, Walter, Cambridgeport.
Read, Charles A., Manchester.
Reardon, John B., Boston.
Reed, George W., Boston.
Rice, George C., Worcester.
Richards, John J., Boston.
Richardson, Charles E., Cambridge.
Rinn, J. Ph., Boston.
Ripley, Charles, Dorchester.
Ripley, Ebed L., Hingham Centre.
Robbins, I. Gilbert, Wakefield.
Robinson, John, Salem.
Robinson, Joseph B., Allston.
Robinson, Warren J., Somerville.
Ross, Henry, Newtonville.
Ross, Waldo O., Boston.
Ruddick, William H., M. D., South Boston.
Russell, George, Woburn.
Russell, Hon. John E., Leicester.
Russell, Walter, Arlington.

Salisbury, William C. G., Brookline.
Sampson, George R., Andover.
Sanford, Oliver S., Hyde Park.
Sargent, Charles S., Brookline.
Saville, Richard L., Brookline.
Sawtelle, Eli A., Boston.
Sawyer, Timothy T., Charlestown.
†Scott, Charles, Newton.
Sears, J. Montgomery, Boston.
Shaw, Christopher C., Milford, N. H.
Shorey, John L., Lynn.
Shuman, Hon. A., Roxbury.
Siebrecht, H. A., New Rochelle, N.Y.
Skinner, Francis, Boston.
Smith, Benjamin G., Cambridge.
Smith, Calvin W., Wellesley Hills.
Smith, Charles H., Jamaica Plain.
Smith, Charles S., Lincoln.
Smith, Chauncey, Cambridge.
Smith, Edward N., San Francisco.
Smith, George O., Boston.
Smith, James H., Dedham.
Smith, Thomas Page, Waltham.
Snow, Miss Salome H., Brunswick, Me.
Spaulding, Edward, West Newton.
Speare, Alden, Newton Centre.
Spooner, William H., Jamaica Plain.
Springall, George, Malden.
Stearns, Frank W., Newton.
Stetson, Nahum, Bridgewater.
Stewart, William J., Winchester.
Stone, Amos, Charlestown.
Stone, Charles W., Boston.
Stone, George F., Chestnut Hill.
Strater, Herman, Roxbury.
Strong, William C., Waban.
Sturgis, Russell, Manchester.
Sturtevant, E. Lewis, M. D., South Framingham.
Surette, Louis A., Concord.
Swain, Charles E., Roxbury.

Taft, John B., Cambridge.
Tarbell, George G., M. D., Boston.
Taylor, Horace B., Portland, Me.
Temple, Felker L., Boston.
Thurlow, Thomas C., West Newbury.
Tidd, Marshall M., Woburn.
Tilton, Stephen W., Roxbury.
Todd, John, Hingham.
Tolman, Benjamin, Concord.
†Tolman, Miss Harriet S., Boston.
Torrey, Everett, Charlestown.
Trepess, Samuel J., Brookline.
†Turner, John M., Dorchester.
Turner, Roswell W., Dorchester.

Underwood, William J., Belmont.

Vanderwoerd, Charles, Waltham.

Vinal, Miss Mary L., Somerville.

Wainwright, William L., Braintree.
Wakefield, E. H., Cambridge.
Walcott, Henry P., M. D., Cambridge.
Wales, George O., Braintree.
Walker, Edward C. R., Roxbury.
Walker, Miss Mary S., Waltham.
Walley, Mrs. W. P., Boston.
Walton, Daniel G., Wakefield.
Ward, Francis Jackson, Roxbury.
Ward, John, Newton Centre.
Wardwell, William H., Brookline.
Ware, Benjamin P., Clifton.
Washburn, Andrew, Hyde Park.
Waters, Edwin F., Boston.
Waters, Dr. George F., Boston.
Watson, Benjamin M., Jr., Jamaica Plain.
Watson, Thomas A., East Braintree.
Watts, Isaac, Waverly.
Webber, Aaron D., Boston.
Weld, Christopher Minot, Jamaica Plain.
Weld, George W., Newport, R. I.
Weld, Richard H., Boston.
Weld, William G., Boston.
West, Mrs. Maria L., Neponset.
Weston, Leonard W., Lincoln.
Weston, Seth, Revere.
Wheeler, Frank, Concord.
Wheelwright, A. C., Brookline.
Whitcomb, William B., Medford.
White, Edward A., Boston.
White, Francis A., Brookline.
White, Joseph H., Brookline.
†Whitely, Edward, Cambridgeport.
Whitten, Charles V., Dorchester.
Whittier, Hon. Charles, Roxbury.
†Whytal, Thomas G., New York, N. Y.
Wilbur, George B., West Newton.
Wilder, Edward Baker, Dorchester.
Wilder, Henry A., Malden.
Willard, E. W., Newport, R. I.
Willcutt, Levi L., West Roxbury.
Williams, Aaron D., Boston.
Williams, Benjamin B., Boston.
Williams, Philander, Taunton.
Willis, George W., Chelsea.
Willis, Joshua C., Roxbury.
Wilson, Col. Henry W., Boston.
Wilson, William Power, Boston.
Winthrop, Robert C., Jr., Boston.
Wood, Charles G., Boston.
Wood, Luke H., Marlborough.
Wood, William K., West Newton.
Woods, Henry, Boston.
Wright, George C., West Acton.
Wyman, Oliver B., Shrewsbury.

ANNUAL MEMBERS.

Members of the Society and all other persons who may know of deaths, changes of residence, or other circumstances showing that the following list is inaccurate in any particular, will confer a favor by promptly communicating to the Secretary the needed corrections.

Abbott, Samuel L., M. D., Boston.
Allen, Charles L., Floral Park, N.Y.
Arnold, Mrs. Anna E., Roxbury.
Atkinson, Charles M., Brookline.
Atkinson, Edward, Brookline.
Atkinson, William B., Newburyport.

Bacon, Augustus, Roxbury.
Badlam, William H., Dorchester.
Barker, John G., Jamaica Plain.
Beard, Edward L., Cambridge.
Benedict, Washington G., Boston.
Bicknell, Hon. Thomas W., Dorchester.
Bigelow, Arthur J., Eastlake, Worcester.
Bigelow, Mrs. Nancy J., Southboro'.
Bird, John L., Dorchester.
Bird, Mrs. Sarah Elizabeth, Roxbury.
Bliss, Benjamin K., East Bridgewater.
Bock, William A., North Cambridge.
Bolles, Matthew, Boston.
Bolles, William P., Roxbury.
Boyden, Clarence F., Taunton.
Breck, Charles H., Newton.
Breck, Charles H. B., Brighton.
Brooks, George, Brookline.
Brown, David H., West Medford.
Butler, Edward, Wellesley.
Buxton, Mrs. Rose, Peabody.

Carroll, James T., Chelsea.
Carter, Mrs. Sarah D. J., Wilmington.
Chaffin, John C., Newton.
Chase, Joseph S., Malden.
Chase, Leverett M., Roxbury.
Cheney, Amos P., Natick.
Chubbuck, Isaac Y., Roxbury.
Clapp, Henry L., Roxbury.
Clark, John Spencer, Boston.
Clark, Joseph, Manchester.
Clark, Theodore M., Newtonville.
Codman, Philip, Jamaica Plain.
Coleman, Mrs. S. H., Jamaica Plain.
Collins, Frank S., Malden.
Collins, Hon. P. A., Dorchester.
Comley, James, Lexington.
Coolidge, David H., Jr., Boston.
Coolidge, Sumner, Mt. Auburn.
Cotter, Lawrence, Dorchester.
Crosby, J. Allen, Jamaica Plain.
Curtis, Joseph H., Boston.
Curtis, Louville, Tyngsborough.

Davis, Frederick, Saxonville.
Davis, Frederick S., West Roxbury.
Davis, Thomas M., Cambridgeport.
Dolbear, Mrs. Alice J., College Hill.
Doliber, Thomas, Brookline.
Doran, Enoch E., Brookline.
Doyle, William E., East Cambridge.
Duffley, Daniel, Brookline.

Eaton, Jacob, Cambridgeport.
Eaton, Warren E., Reading.
Endicott, Miss Charlotte M., Canton.

Faxon, Edwin, Jamaica Plain.
Felton, Arthur W., West Newton.
Fenno, Warren, Revere.

Fisher, Sewall, Framingham.
Forbes, William H., Jamaica Plain.
Foster, Joshua T., Medford.
Frohock, Roscoe R., Malden.
Frost, Artemas, Belmont.
Frost, George, West Newton.
Frost, Varnum, Arlington.
Fuller, T. Otis, Needham.

Gage, Alfred P., Arlington.
Gibbon, Mrs. James A., Brookline.
Gilbert, Samuel, Boston.
Gill, Mrs. E. M., Medford.
Goddard, Thomas, Boston.
Grant, Charles E., Concord.
Guerineau, Louis, Northampton.

Haile, Hon. William H., Springfield.
Hall, Charles H., M. D., Boston.
Hall, Harry B., Roxbury.
Hall, Stacy, Boston.
Hall, William T., Revere.
Hanks, Mrs. C. Stedman, Manchester.
Hargraves, William J., Jamaica Plain.
Harris, Miss Ellen M., Jamaica Plain.
Harris, Frederick L., Wellesley.
Hartwell, Samuel, Lincoln.
Harwood, George S., Newton.
Henshaw, Samuel, West Brighton, N. Y.
Hersey, Alfred H., Hingham.
Hersey, Edmund, Hingham.
Heustis, Warren H., Belmont.
Hews, Albert H., North Cambridge.
Hill, Benjamin D., Peabody.
Hill, Edwin S., Clarendon Hill.
Hill, J. Willard, Belmont.
Hobbs, George M., Boston.
Hollis, George, South Weymouth.
Houghton, George S., Auburndale.
Hubbard, F. Tracey, Cambridge.
Hunt, Henry C., Newton.
Huston, Miss Katharine W., Roxbury.

James, Robert Kent, Dorchester.
Jameson, G. W., East Lexington.
Jordan, Hon. Jediah P., Roxbury.

Kenrick, Miss Anna C., Newton.
Kidder, Francis H., Medford.

Lamprell, Simon, Marblehead.
Lancaster, Mrs. E. M., Roxbury.
Langmaid, Mrs. Mary, Somerville.
Lawrence, Henry S., Roxbury.
Lawrence, Sidney, East Lexington.
Lee, Francis H., Salem.
Lee, William W., Northampton.
Lomax, George H., Somerville.
Lombard, Richard T., Wayland.
Loring, Charles G., Boston.
Loring, John A., North Andover.
Lothrop, Thornton K., Boston.
Loud, Mrs. Mary E., Roxbury.
Low, Hon. Aaron, Hingham.
Lowell, John, Newton.
Lunt, William W., Hingham.

Manda, W. A., South Orange, N. J.
Manning, A. Chandler, Reading.
Manning, J. Woodward, Reading.
Markoe, George F. H., Roxbury.
Martin, William H., Dorchester.
Martin, William J., Milton.
Masten, Cornelius E., Roxbury.
Maxwell, Charles E., Boston.
May, F. W. G., Boston.
McDermott, Andrew, Roxbury.
McDowell, Mrs. Mary, Boston.
McIntosh, Aaron S., Roxbury.
McLaren, Anthony, Forest Hills.
McMullen, Edgar, Boston.
Meredith, Albert A. H., Milton.
Meriam, Horatio C., D.M.D., Salem.
Merrill, John J., Roxbury.
Merrill, Capt. S. A., Wollaston Heights.
Milman, William, Roxbury.

Newton, John F., Roxbury.
Norton, Edward E., Boston.
Norton, Michael H., Boston.
Norton, Patrick, Boston.

Olmsted, Frederick Law, Brookline.

Park, William D., Boston.
Park, William P., West Boxford.
Parker, George A., Halifax.
Parker, John, Newtonville.
Parker, Walter S., Reading.
Patterson, William, Quincy.
Peirce, George H., Concord.
Peterson, Ellis, Jr., Jamaica Plain.
Petremant, Robert, Dorchester.
Pigott, Thomas E., Winthrop.
Pitcher, James R., Short Hills, N. J.
Plimpton, Willard P., West Newton.
Power, Charles J., South Framingham.
Prichard, Joseph V., Boston.
Purdie, George A., Wellesley Hills.
Putnam, Charles A., Salem.

Randall, Macey, Stoughton.
Rich, Miss Ruth G., Dorchester.
Rich, William E. C., Roxbury.
Rich, William P., Chelsea.
Richards, Mrs. P. D., West Medford.
Robbins, Oliver R., Weston.
Robinson, Nathan D., Roxbury.
Robinson, Walter A., Roxbury.
Robinson, William, North Easton.
Ross, Charles W., Newtonville.
Ross, Henry Wilson, Newtonville.

Saunders, Miss Mary T., Salem.
Sawtell, J. M., Fitchburg.
Schmitt, Georg A., Boston.
Scott, Augustus E., Lexington.
Scudder, Samuel H., Cambridge.
Seaver, Edwin P., LL.D., Newton Highlands.
Sharples, Stephen P., Cambridge.
Shattuck, Frederick R., Roxbury.
Shedd, Abraham B., Waltham.
Sheppard, Edwin, Lowell.
Snow, Eugene A., Melrose.
Snow, Francis B., Dorchester.
Southworth, Edward, Quincy.
Spencer, Aaron W., Boston.
Squire, Miss Esther A., North Cambridge.
Stearns, Mrs. Charles A., East Watertown.
Stearns, Charles H., Brookline.
Stevens, Miss Mary O., North Andover.
Stone, Samuel G., Charlestown.
Storer, Charles, Boston.
Story, Miss Sarah W., Brighton.
Swan, Charles W., M. D., Boston.
Sweet, Everell F., Malden.

Tailby, Joseph, Wellesley.
Talbot, Josiah W., Norwood.
Teele, William H., West Acton.
Terry, Rev. Calvin, North Weymouth.
Tobey, Rufus T., Roxbury.
Tobey, S. Edwin, Boston.
Travis, Charles B., Brighton.
Turner, Nathaniel W., Boston.
Tyndale, Theodore H., Brookline.

Vaughan, J. C., Chicago, Ill.

Warren, Samuel H., Weston.
Welch, Patrick, Dorchester.
Weld, Charles E., Roslindale.
Wells, Benjamin T., Newtonville.
Weston, Mrs. L. P., Danvers.
Westwood, Thomas, Jamaica Plain.
Wheeler, James, Brookline.
White, Maurice P., Roxbury.
White, W. Henry, Lowell.
Whitney, Joseph, Cambridgeport.
Whiton, Hon. Starkes, Hingham Centre.
Wilcox, George D., M. D., Providence, R. I.
Wilmarth, Henry D., Jamaica Plain.
Wilson, B. Osgood, Watertown.
Winship, Rev. Albert E., Somerville.
Winter, William C., Mansfield.
Wolcott, Mrs. Henrietta L. T., Dedham.

Wood, Mrs. Anna D., West Newton.
Wood, Elijah A., West Newton.
Wood, E. W., West Newton.
Woodford, Joseph H., Boston.
Worthington, Roland, Roxbury.
Young, Arthur W., Hingham.
Young, Charles S., Newton Centre.
Young, E. Bentley, Boston.
Zirngiebel, Denys, Needham.

EXTRACTS FROM THE CONSTITUTION AND BY-LAWS.

SECTION XXVII.—Life Members.

The payment of thirty dollars shall constitute a Life Membership, and exempt the member from all future assessments. And any subscription member, having paid all dues, may become a Life Member by the payment of twenty dollars in addition thereto.

SECTION XXVIII.—Admission Fee and Annual Assessment.

Every subscription member, before he receives his diploma, or exercises the privileges of a member, shall pay the sum of ten dollars as an admission fee, and shall be subject afterwards to an annual assessment of two dollars.

SECTION XXX.—Discontinuance of Membership.

Any member may withdraw from the Society, on giving notice to the Treasurer and paying the amount due from him. Any member who shall neglect for the space of two years to pay his annual assessment, after due notice from the Treasurer, shall cease to be a member. The Treasurer shall give notice of such withdrawals or discontinuances to the Secretary, who shall erase such members' names from the list.

The attention of Annual Members is particularly called to Section XXX.

HONORARY MEMBERS.

Members and correspondents of the Society and all other persons who may know of deaths, changes of residence, or other circumstances showing that the following list is inaccurate in any particular, will confer a favor by promptly communicating to the Secretary the needed corrections.

Information, or any clew to it, is especially desired in regard to Joseph Maxwell, *elected in* 1830, *and* George W. Smith, *elected in* 1851.

The names of deceased Honorary Members may be found in Part II of the Transactions *of previous years.*

Hon. George S. Boutwell, Groton.
Hon. Ephraim W. Bull, Concord.
H. W. S. Cleveland, Minneapolis, Minn.
Hon. Joseph S. Fay, Wood's Holl.
Major L. A. Huguet-Latour, M. P., Montreal, Canada.
Edward Winslow Lincoln, Secretary of the Worcester County Horticultural Society.
Col. Theodore Lyman, Brookline.
Joseph Maxwell, Rio Janeiro, Brazil.
Rev. James H. Means, Dorchester.
Donald G. Mitchell, New Haven, Conn.
Hon. J. Sterling Morton, Secretary of Agriculture, Washington, D. C.
Baron R. Von Osten Sacken, Heidelberg, Germany.
Samuel B. Parsons, Flushing, N. Y.
Samuel R. Payson, Boston.
George W. Smith, Boston.
John J. Thomas, Union Springs, N. Y.
Hon. Robert C. Winthrop, Boston.

CORRESPONDING MEMBERS.

Members and correspondents of the Society and all other persons who may know of deaths, changes of residence, or other circumstances showing that the following list is inaccurate in any particular, will confer a favor by promptly reporting to the Secretary the needed corrections.

Information, or any clew to it, is especially desired in regard to Alexander Burton, *elected in* 1829, S. Reynolds, M. D., 1832, *and* Francis Summerest (or Summerer), 1833.

The names of deceased Corresponding Members may be found in Part II of the TRANSACTIONS *of previous years.*

ÉDOUARD ANDRÉ, Editor in Chief of the Revue Horticole, Paris, France.

PROFESSOR L. H. BAILEY, Jr., Cornell University, Ithaca, N. Y.

NAPOLEON BAUMANN, Bolwiller, Alsace.

D. W. BEADLE, St. Catherine's, Ontario.

PROFESSOR WILLIAM J. BEAL, Agricultural College, Michigan.

PROSPER J. BERCKMANS, President of the American Pomological Society, Augusta, Ga.

CHARLES E. BESSEY, Ph.D., Professor of Botany in the Industrial College of the University of Nebraska, Lincoln.

DR. CH. BOLLE, Berlin, Prussia.

JOHN CROUMBIE BROWN, LL.D., Haddington, Scotland.

PROFESSOR J. L. BUDD, Secretary of the Iowa Horticultural Society, Ames.

WILLIAM BULL, Chelsea, England.

ALEXANDER BURTON, United States Consul at Cadiz, Spain, Philadelphia.

ISIDOR BUSH, Bushberg, Jefferson Co., Mo.

GEORGE W. CAMPBELL, President of the Ohio State Horticultural Society, Delaware, O.

MAXIME CORNU, Director of the Jardin des Plantes, Paris, France.

BENJAMIN E. COTTING, M. D., Boston.

REV. H. HONYWOOD D'OMBRAIN, Westwell Vicarage, Ashford, Kent, England.

ROBERT DOUGLAS, Waukegan, Ill.

MALCOLM DUNN, Dalkeith, Scotland.

W. T. THISELTON DYER, C.M.G., F.R.S., Director of the Royal Botanic Gardens, Kew, England.

PARKER EARLE, President of the American Horticultural Society, Cobden, Ill.

GEORGE ELLWANGER, Rochester, N. Y.
HENRY JOHN ELWES, F.L.S., F.Z.S., Colesborn, Andoversford, Gloucestershire, England.
WILLIAM G. FARLOW, M. D., Professor of Cryptogamic Botany, Harvard University, Cambridge.
B. E. FERNOW, Chief of the Division of Forestry, Department of Agriculture, Washington, D. C.
ANDREW S. FULLER, Ridgewood, N. J.
HON. ROBERT W. FURNAS, Ex-President of the Nebraska State Horticultural Society, Brownville.
CHARLES A. GOESSMANN, Ph.D., Director of the State Agricultural Experiment Station, Amherst.
GEORGE L. GOODALE, M. D., Professor of Botany, Harvard University, Cambridge.
OBADIAH B. HADWEN, Ex-President of the Worcester County Horticultural Society, Worcester.
J. H. HART, Superintendent of the Botanic Garden, Trinidad.
ROBERT HOGG, LL.D., Editor of the Journal of Horticulture, London.
J. C. HOLDING, Ex-Treasurer and Secretary of the Cape of Good Hope Agricultural Society, Cape Town, Africa.
REV. S. REYNOLDS HOLE, Rochester, England.
SIR JOSEPH HOOKER, K.C.S.I., The Camp, Sunningdale, England.
JOSIAH HOOPES, West Chester, Pa.
GEORGE HUSMANN, Napa, Cal.
JOHN W. P. JENKS, Middleborough.
WILLIAM J. JOHNSON, M.D., Fort Gaines, Ga.
CHARLES JOLY, Vice-President of the Société Nationale d'Horticulture de France, Paris.
DR. GEORGE KING, Superintendent of the Royal Botanic Garden, Calcutta.
PROFESSOR WILLIAM R. LAZENBY, Secretary of the Agricultural Experiment Station, Columbus, O.
MAX LEICHTLIN, Baden-Baden, Germany.
G. F. B. LEIGHTON, President of the Norfolk Horticultural and Pomological Society, Norfolk, Va.
VICTOR LEMOINE, Nancy, France.
J. LINDEN, Ghent, Belgium.
T. T. LYON, President of the Michigan Horticultural Society, South Haven.
DR. P. MACOWAN, Director of the Botanic Garden, Cape Town, Africa.
DR. MAXWELL T. MASTERS, Editor of the Gardeners' Chronicle, London.
GEORGE MAW, Benthal, Kinley, Surrey, England.
T. C. MAXWELL, Geneva, N.Y.
THOMAS MEEHAN, Germantown, Pa.
DR. CHARLES MOHR, Mobile, Ala.
D. MORRIS, F.L.S., Assistant Director of the Royal Botanic Gardens, Kew, England.
CH. NAUDIN, Antibes, France.
GEORGE NICHOLSON, Curator of the Royal Botanic Gardens, Kew, England.

WILLIAM PAUL, Waltham Cross, London, N.
PROFESSOR D. P. PENHALLOW, Director of the Botanic Garden, Montreal, Canada.
HENRY PROBASCO, Cincinnati, O.
P. T. QUINN, Newark, N.J.
D. REDMOND, Ocean Springs, Miss.
S. REYNOLDS, M. D., Schenectady, N. Y.
CHARLES V. RILEY, Washington, D. C.
WILLIAM ROBINSON, Editor of The Garden, London.
EDGAR SANDERS, Chicago, Ill.
WILLIAM SAUNDERS, Department of Agriculture, Washington, D. C.
WILLIAM R. SMITH, Curator of the Botanic Garden, Washington, D. C.
ROBERT W. STARR, Port William, N. S.
DR. JOSEPH STAYMAN, Leavenworth, Kan.
WILLIAM A. STILES, Editor of Garden and Forest, Deckertown, N. J.
WILLIAM SUMMER, Pomaria, S. C.
FRANCIS SUMMERST.
WILLIAM TRELEASE, Director of the Missouri Botanic Garden, St. Louis.
DR. MELCHIOR TREUB, Director of the Botanic Garden, Buitenzorg, Java,
H. J. VEITCH, Chelsea, England.
HENRY L. DE VILMORIN, Secretary of the Société Nationale d'Agriculture de France, Paris.
ANTHONY WATERER, Knap Hill, near Woking, Surrey, England.

LIBRARY ACCESSIONS.

Instead of, as heretofore, dividing this list into Books Purchased and Books, etc., received by Donation and Exchange, all are incorporated in one list, in the belief that those who wish to know what has been added to the Library on any subject will find it more easy of reference. Books purchased from the income of the Stickney Fund are marked S. F.; and those purchased from the Society's Appropriation for the Library, L. A. All others were received by donation and exchange, and the source whence received is given in every instance when known.

The measurements of the books are in inches and tenths of of an inch, giving first the height, next the thickness, and lastly the width. When a pamphlet is less than one-tenth of an inch in thickness the place of that dimension is supplied by a dash.

HORTICULTURE.

Long, Elias A. How to Plant a Place. A Brief Illustrated Guide, Suited to Popular use. Tenth edition, revised and enlarged. (The Rural Library. Vol. 1, No. 4. February, 1892.) Pamphlet, light brown, 7.8×.1×5.4, pp. 28; 64 cuts. New York: [1892]. L. A.

Bailey, L. H. The Horticulturist's Rule-Book. A Compendium of Useful Information for Fruit-Growers, Truck-Gardeners, Florists and others. Completed to the beginning of the year 1892. 2d edition, revised. Brown cloth, 7.5×.7×5.2, pp. 231. New York. S. F.

Hitchings & Co., *Publishers.* Greenhouse Heating and Ventilating Apparatus. Pamphlet, red, 9.8×.2×7.3, pp. 64; cuts. The Publishers.

——— — —, ———. Greenhouse Construction. Pamphlet, green, 9.7×.1×7.2, pp. 16, (2); cuts. The Publishers.

American Horticultural Annual. A Year-Book of Horticultural Progress for the Professional and Amateur Gardener, Fruit Grower, and Florist. 1870 and 1871. 2 vols. Green paper, 7.5×.4×4.9, (I.) pp. 152; 84 cuts: (II.) pp. 152; 57 cuts. New York.

Bailey, L. H. Annals of Horticulture in North America, for the year 1890. A Witness of Passing Events and a Record of Progress. Dull green cloth, 8.2×.8×5.8, pp. 312; 76 cuts, portraits. New York: 1891. S. F.

For the year 1891. Gray cloth, 8.1×1.×5.9, pp. 415; 77 cuts. New York: 1892. S. F.

American Florist Company's Directory of the United States and Canada. Supplement, for 1893, bringing the edition of 1892 up to date. Pamphlet, 8.3×—×5.7, pp. 22. [Chicago: 1893.] William J. Stewart.

Gardener's Almanack and Poultry Keeper's and Apiarian's Calendar, for the year 1868. Edited by George W. Johnson, Esq., F. R. H. S., assisted by Edward Hewitt and T. W. Woodbury. Pamphlet, blue, 7.1×.2×5.8, pp. 101. London.

Horticultural Directory for 1868. Pamphlet, blue, green cloth back, 7.3×.4×4.8, pp. 166. London.

Horticultural Directory and Year Book for 1893. 34th year of publication. Blue green paper, 7.1×1.×4.9, pp. 480. London: [1893]. S. F.

Garden Oracle and Illustrated Floricultural Year Book, 1893. By the Editor of "The Gardeners' Magazine." 35th year of publication. Half red cloth, 7.3×.8×5.1, pp 246; 2 colored plates, cuts. London. S. F.

Tillier, Louis, *and others.* L'Année Horticole. Revue annuelle des nouveautés en horticulture. Première Année.— 1892. Light tan-colored cloth, 7.1×.6×4.5, pp. v, 216. Paris: 1893. S. F.

Joly, Charles. Note sur le Jardin-école de Soissons. Pamphlet, blue gray, 8.5×—×5.3, pp. 6; plan and plate. Paris: 1893. The Author.

HORTICULTURAL JOURNALS.

Trade Journal, The, and International Horticulturist, for Nurserymen, Florists, and Seedsmen. [Formerly The International Horticulturist, etc.] Vol. I, No. 12, Vol. II, Nos. 1–7, Vol. III, No. 2. April, 1889 to June 15, 1890. 9 pamphlets, 11.8×—×8.5, cuts. Harrisburg, Pa.: 1889, 1890. L. H. Bailey.

Gardening World Illustrated, The. A weekly paper exclusively devoted to all branches of practical Gardening. Vols. 1–8. 1884–5 to 1891–2. 8 vols. Half green morocco, 14.2×2.1×11. London. L. A.

British Gardening. [Formerly the Northern Gardener.] Vols. 4–9, inclusive. July, 1890 to June, 1893. Unbound, blue paper, 10.9×.1×8.5. London: 1890–1893. L. A.

Jornal de Horticultura pratica. 23 vols. Vols. 1–18 edited by Duarte de Oliveira, Junior; vol. 19 by Joachim Casimiro Barbosa; vols. 20–23 by Eduardo Sequeira. Vols. 1, 16, 17, 19–23 bound in light gray paper, 10.8×.8×7.3, others unbound; plain and colored plates, portraits, cuts. Porto: 1870–1892. L. A.

HORTICULTURAL SOCIETIES.

World's Horticultural Society. Circular concerning the organizing of the, etc. Broadside 11.9×9. P. J. Berckmans, President.

——— —— ——, Constitution of the. Broadside, 11.9×9. P. J. Berckmans, President.

Worcester County Horticultural Society. Transactions for 1881, 1886—1890–91 and 1892–93. Schedules of Premiums for 1889, 1890, 1892, 1893. 11 pamphlets, 9.1–10.2×.1–.4×6. Worcester: 1881–1893. Edward W. Lincoln, Secretary.

Rhode Island Horticultural Society. November Exhibition, 1893.—Chrysanthemums. Pamphlet, 8.4×—×5.4, pp. 4. C. W. Smith, Secretary.

Hartford County (Conn.) Horticultural Society. Premium List for the year 1893. Pamphlet, yellow, 9.3×—×5.9, pp. 15. [Hartford: 1893.] Edward S. Young, Secretary.

Western New York Horticultural Society. Proceedings of the Thirty-Eighth Annual Meeting, held at Rochester, . . . Jan. 25 and 26, 1893. Pamphlet, light blue, 8.5×.3×5.7, pp. 152. Rochester: 1893. John Hall, Secretary. [4 copies.]

New Jersey State Horticultural Society. Proceedings at its Eighteenth Annual Session, held at Trenton, N. J., Dec. 14th and 15th, 1892. Pamphlet, blue gray, 9.×.5×5.8, pp. (4), 152. Mount Holly, N. J.: 1893. H. I. Budd, Recording Secretary.

Pennsylvania State Horticultural Association. Reports for 1889–1892. 4 pamphlets, tea, 9.3×.2×6.1, plain and colored plates, cuts. Harrisburg: 1890–1893. E. B. Engle, Recording Secretary.

Wayne [Pa.] Horticultural Society. Premium list for 1893. Pamphlet, light brown, 9.1×—×5.9, pp. 24. Frank Smith, Secretary.

Peninsula Horticultural Society. Transactions. Third Annual Session, held at Chestertown, Md., January 28–30, 1890. Pamphlet, blue, 8.8×.3×5.8, pp. 95.

Fourth Annual Session, held at Easton, Md., January 20–22, 1891. Pamphlet, tea, 9.×.2×5.7, pp. 112.

Fifth Annual Session, held at Dover, Del., January 19–21, 1892. Pamphlet, light brown, 8.9×.2×5.7, pp. 105. Wilmington, Del.: 1892. [W. Wesley Webb, Secretary.]

North Carolina State Horticultural Society. Thirteenth Annual Report, 1893. By Gerald McCarthy, Secretary. Pamphlet, light gray, 9.1×.1×5.8, pp. 68. Raleigh: 1893. The Secretary.

Georgia State Horticultural Society. Proceedings of the Seventeenth Annual Meeting, held in the city of Rome, August 3 and 4, 1892. Pamphlet, light green, 9.2×.1×5.9, pp. 86. Atlanta: 1893. George H. Miller, Secretary.

Florida State Horticultural Society. Proceedings of the Fifth Annual Meeting, held at Ormond, Florida, May 3d, 4th, and 5th, 1892. Brown cloth, 9.3×.4×6.2, pp. 142; portrait. J. M. Hawks, M. D.

Texas State Horticultural Society, Initial Report of the, for 1886 to 1889, inclusive. Black cloth, 9.3×.3×6., pp. 106. College Station: 1889. E. L. Huffman, Secretary.

—— —— —— ——. Report of the [Fifth] Annual Meeting, for the year 1891. Pamphlet, terra cotta, 7.5×.3×4.9, pp. 107. Brenham, Texas: 1891. D. H. Watson, Secretary.

Ohio State Horticultural Society. Twenty-sixth Annual Report, for the year 1892–93. Black cloth, 9.8×.7×6.7, pp. 253; 14 cuts. Norwalk: 1893. W. W. Farnsworth, Secretary.

Columbus [Ohio] Horticultural Society. Historical Statement, Constitution, By-Laws, etc. 1892. Pamphlet, tea, 8.8×—×5.9, pp. 16. Aug. D. Selby, Secretary.

——— —— —— ——. Annual Report . . . containing Constitution, Lists of Members, and Quarterly Journal. Prepared by Aug. D. Selby, Secretary. Vol. 7, No. 4, December 1892, and Vol. 8, Nos. 1 and 2, March and June, 1893. 3 pamphlets, gray, orange, etc., 9.2 ×.1×5.8, pp. 101–183, 1–82; 1 portrait [in No. 4]. Columbus, Ohio: [1892 and 1893.] The Secretary.

Michigan State Horticultural Society. Twentieth Annual Report of the Secretary. 1890. Black cloth, 9.5×1.1×6.7, pp. (8), 372; portrait, cuts. Lansing: 1891.

Twenty-first Annual Report. 1891. Black cloth, 9.5×1.8×7., pp. (8), 739; cuts. [Contains general index to Vols. 10–20, 1880–1890 inclusive.] Lansing: 1891. Edwy C. Reid, Secretary.

Illinois State Horticultural Society. Transactions for the year 1892, being the Proceedings of the Thirth-seventh Annual Meeting, held at Champaign, December 6, 7, and 8. Also Proceedings of the Central and Southern District Societies, and a number of county societies for the year 1892. New Series. — Vol. XXVI. Dark green cloth, 8.9×1.7×6.5, pp. xv, 432. Warsaw: [1893.] A. C. Hammond, Secretary. [5 copies.]

Missouri State Horticultural Society. Thirty-fifth Annual Report, 1892. Dark maroon cloth, 9.2×.7×6.3, pp. 323, ii. Jefferson City: 1893. L. A. Goodman, Secretary. [40 copies.]

Nebraska State Horticultural Society. Annual Report. 1884. [Contained in duplicate copy of Annual Reports of the Nebraska State Board of Agriculture and the State Horticultural Society. 1884.] Pamphlet, tea, 8.6×.4×5.7, pp. 99. Lincoln: 1886. Hon. Robert W. Furnas, Secretary, Nebraska State Board of Agriculture.

Annual Reports, 1885 and 1886. Black cloth, 9.×.4×5.7, pp. 66, and 67–150. Lincoln, Neb.: 1887. F. W. Taylor, Secretary.

Annual Report. For the year 1893. Containing the Proceedings of the Summer Meeting held at Nebraska City, June 30, and July 1, 1892, and of the Annual Meeting held at Lincoln, January 10, 11, 12, 1893. Black cloth, 8.9×.7×5.8, pp. 284; portrait, 72 cuts. Lincoln: 1893. F. W. Taylor, Secretary.

Minnesota State Horticultural Society. Twenty-first Annual Report. 1892. Vol. XXI. Black cloth, 9.3×1.1×6.4, pp. 414; 1 portrait. Minneapolis: 1893. A. W. Latham, Secretary.

Colorado State Bureau of Horticulture. Annual Reports for the years 1891–92. Vol. VI. By Dr. Alexander Shaw, Secretary. Brown cloth, 9.2×.7×6.1, pp. 263; 4 cuts. Colorado Springs: 1892. George J. Spear.

Washington State Board of Horticulture. First Biennial Report, for the years 1891–92. Blue green cloth, 9.1×.7×6.1, pp. (8), 304; 1 plate, cuts. Olympia: 1893. C. A. Tonneson, Secretary.

Royal Horticultural Society. Journal. Vol. XV, Parts 2 and 3. January 1893. Edited by the Rev. W. Wilks, M. A., Secretary, and Mr. John Weathers, Assistant Secretary. Pamphlet, blue gray, 8.4×.9×5.4, pp. 73–268, iv, cciv; 32 cuts. London: [1893.] The Secretary.

Vol. XVI, Part 1. August, 1893. Pamphlet, blue gray, 8.5×.7×5.4, pp. 160, cxvi; 32 cuts. London: [1893.] The Secretary.

Norsk Havetidende. Udgivet af selskabet Havedyrkningens Venner. Redigeret af Peter Nøvik, Gartner. Vols. 2–9, 1886–1893. 8 pamphlets, buff, 8.9–9.5×.4×5.7–6.1, portraits, plates, cuts. Christiania. Peter Nøvik. [A second copy of the 8th volume from Professor Charles S. Sargent].

France, Société nationale d'Horticulture de. Journal, 3e série, Tome 15, 1893. Half claret morocco, 9.2×1.8×5.5, pp. 888. Paris: 1893. E. Glatigny, Librarian.

——, —— ——. —— —. Liste générale des membres de la Société. Arrêtée au 1er Mars 1893. (Supp. Jour. Soc. nat. d'Hort. de France, Numéro de Février, 1893.) Pamphlet, gray, 9.×.4×5.7, pp. 158, (1). Paris: [1893.] E. Glatigny, Librarian.

Seine-Inférieure, Société Centrale d'Horticulture de la. Bulletin. Tome XXXIVe.—3e et 4e cahiers de 1892; Tome XXXVe.—1er et 2e cahiers de 1893. 4 pamphlets, lilac-color, 9.×.2×5.7, pp. 157–354, 1–148; tables. Rouen: 1892, 1893. The Society.

Sarthe, Société d'Horticulture de la. Bulletin. Tome 12.—1892, 3e et 4e trimestres; 1893, 1e et 2e trimestres. 4 pamphlets, orange, 8.8×—×5.7, pp. 205–347, (5). Le Mans: 1892, 1893. The Society.

Cercle horticole du Nord, Bulletin du. 23e et 24e Années. 24 numbers, January, 1892, to December, 1893. 24 pamphlets, blue gray, 8.2×—×5.2, pp. 296 and 296; cuts. [Lille: 1892, 1893.] M. Mulnard, Secrétaire.

—— —— — ——, —— —. Supplément. Ville de Lille. Grande Exposition internationale des Produits de l'Horticulture et Industries connexes . . . septembre, 1893, etc. Pamphlet, salmon-color, 8.2×.1×5.2, pp. 36. Lille: 1893. M. Mulnard.

Liège, Fédération des Sociétés Horticoles de.—Société Royale d'Horticulture, Cercle Royal d'Arboriculture, Union Horticole.—Exposition Internationale, 24 au 28 septembre, 1893. Resultat des Concours. Pamphlet, 8.2×.1×5.4, pp. 46. Liège: 1893.

Gartenflora. Zeitschrift für Gärten- und Blumenkunde. (Begründet von Eduard Regel.) 41 Jahrgang. Herausgegeben von Dr. L. Wittmack. 24 numbers. Pamphlets, yellow, 10.1×.1×7., pp. 670, 126; 24 colored plates, 139 cuts. Berlin: 1892. Dr. L. Wittmack, Secretary of the Berlin Horticultural Society.

Genève, Société d' Horticulture de. Bulletin. 38me Année, 1892; 39me Année, 1893. 24 pamphlets, pink, 9.4×—×6.2, pp. 200, 208; cuts. Genève: 1892, 1893. The Society.

R. Societa Toscana di Orticultura. Bullettino. Anno XVIII. 1893. (Vol. VIII. della 2ª Serie). Half brown leather, 11.×1.7×7.6. pp. 380; 12 plates, colored and plain. Firenze: 1893. The Society.

Nurserymen, American Association of. Proceedings at the Fifteenth Annual Meeting, held at New York, 1890. Pamphlet, blue, 9.2×.4×6., pp. xviii, 132; portrait, plates. [Rochester, N. Y.: n. d.] C. A. Green, Secretary.

Seventeenth Annual Meeting, held at Atlanta, Ga., 1892. Pamphlet, tan-color, 9.×.3×6., pp. (8), 148; portrait. 1892. C. A. Green, Secretary.

FLOWERS AND ORNAMENTAL PLANTS.

Sweert, Emanuel. Florilegium Amplissimum, et selectissimum, quo non tantum varia diversorum florum præstantissimorum et nunquam antea exhibitorum genera, sed et raræ quamplurimæ Indicarum plantarum, et radicum formæ, ad vivum partibus duabus, quatuor etiam linguis offeruntur et delineantur. [3d ? edition.] Parchment, 15.4×1.×10., pp. (38); plates 67 and 48. Amstelodami: 1631. S. F.

Savi, Gaetano. Flora Italiana, ossia Raccolta delle piante più belle, che si coltivano nei giardini d'Italia, etc. 3 vols. [I.] pp. (12), iv, 114, (2); 40 colored plates. Pisa: 1818. [II.] pp. 90, (2); colored plates 41–80. Pisa: 1822. [III.] pp. 86, (2); colored plates 81–120. Pisa: 1824. Half calf, 18.1×1.4×13. S. F.

Bourne, H., A. B. Flores Poetici. The Florist's Manual: designed as an introduction to Vegetable Physiology and Systematic Botany for cultivators of flowers. Dull green cloth, 9.5×1.×6., pp. viii, 9–288; colored cuts. Boston and New York: 1833. S F.

Hunt, M. A. How to Grow Cut Flowers. A Practical Treatise on the cultivation of the Rose, Carnation, Chrysanthemum, Violet and other winter flowering plants. Also Greenhouse Construction. Olive-green cloth, 7.4×.7×5.5, pp. vii, iii, 228; 41 cuts. [Terre Haute, Ind.]: 1893. S. F.

Ellwanger, H. B. The Rose. A treatise on the cultivation, history, family characteristics, etc., of the various groups of roses, with accurate descriptions of the varieties now generally known. By H. B. Ellwanger; with an introduction by George H. Ellwanger. Revised edition. Olive-green cloth, 6.7×1.×4.7, pp. 310. New York: 1892. S. F.

Hatton, W. J. Secrets of Rose Culture. Brown paper, 7.6×.5×5.3, pp. 162. Huntington, N. Y.: 1891. S. F.

D'Ombrain, Rev. H. Honywood, *Editor*. The Rosarian's Year-Book for 1893. Boards, blue gray, 7.1×.3×5.3, pp. (7), 87; portrait. London and Derby: 1893. S. F.

Burpee, W. Atlee, & Co., Publishers. All About Sweet Peas. An Art Monograph by Rev. W. T. Hutchins. Pamphlet, white, 5.8×.1×4.6, pp. 24. Philadelphia: [1892.] The Publishers.

Voorhelm, George. Traité sur la Jacinte. Contenant la manière de la cultiver suivant l'expérience qui en a été faite par George Voorhelm, Fleuriste d'Harlem, connu sous les noms de Voorhelm et Van Zompel. pp. 13, (3), 123; 4 plates. Harlem: 1752.

Also, **Kampen,** Nicolas van, et fils. Traité des Fleurs à Oignons; contenant tout ce qui est nécessaire pour les bien cultiver, fondé sur une expérience de plusieurs années. pp. (8), 117; 1 plate. Harlem: 1760.

Half calf, 7.2×.8×4.6. Ernst H. Krelage.

Dahlia Register, The Annual, for 1836. Etc., etc. Dark green cloth, 10.3×1.1×6.5, pp. vi, 104; 54 colored plates. London: 1836. S. F.

Allen, C. L. Bulbs and Tuberous-Rooted Plants. Their History, Description, Methods of Propagation, and complete Directions for their successful culture in the garden, dwelling, and greenhouse. Wine-colored cloth, 8.×1.2×5.6, pp. vi, 311; cuts. New York: 1893. S. F.

Foster, Prof. Michael, Sec. R. S., F. R. H. S., etc. Bulbous Irises. Published by the Royal Horticultural Society. Blue gray paper, 8.3× .2×5.5, pp. 85, (1), 58 cuts. London: [1892.] S. F.

Tuberous Begonias; Culture and Management, etc. By numerous Practical Growers. Reproduced from The American Garden, with the addition of much new matter. (The Rural Library, Vol. 1, No. 1. February 19, 1891.) Pamphlet, 7.9×—×5.4, pp. 20, cuts. L. A.

Bellair, Georges, et Victor Bérat. Les Chrysanthèmes: Description, Histoire, Culture, Emploi. Deuxième édition. Tan-colored cloth, 7.×.3×4.5, pp. iii, 111; 21 cuts. Paris: 1893. S. F.

Imai, K., Horticulture-amateur in Japan. A Guide to Chrysanthemum Culture. Pamphlet, green, 8.5×—×5.8, pp. 13, (1); 14 cuts. Tokio, Japan: 1892. L. A.

Warner, Robert, F. L. S., F. R. H. S., Henry Williams, F. L. S., F. R. H. S., and William Hugh Gower, F. R. H. S. The Orchid Album, comprising colored figures and descriptions of new, rare, and beautiful Orchidaceous Plants. Vol. 10, parts 115–118. Half green morocco, 12.4×1.2×10., colored plates 457–472, and descriptive text. London: [1893]. S. F.

Sander, F. Reichenbachia.— Orchids illustrated and described. Second series. Vol. 2, parts 1–5. Half green morocco, 21.6×2.×17.6, pp. 44; colored plates 49–68. St. Albans, London, Berlin, New York: [1893]. S. F.

Linden, J., Lucien Linden, and Em. Rodigas. Lindenia.— Iconography of Orchids. Vol. 4, parts 19–24, Vol. 5, parts 25–30 and Vol. 6, part 31. [English Edition.] Half green morocco, 14.2×1.4×11.4, pp. 52, 52, and 12; colored plates 337–388. Ghent: [1893]. S. F.

Marquess of Lothian. The Genus Masdevallia. Issued by the Marquess of Lothian, K. T., chiefly from plants in his collection of Orchids at Newbattle Abbey; plates and descriptions by Miss Florence H. Woolward; with engravings from photographs.

Additional notes by Consul F. C. Lehmann, (German Consul in the Republic of Colombia.) Part III. Blue gray paper, 17.8×.2×12.9, 10 colored plates, with descriptive text. London: 1892. S. F.

Birkenhead, J., F. R. H. S. Ferns and Fern Culture, etc., etc. Green cloth, 7.6×.5×5.2, pp. 128; cuts. [Manchester, Eng.: 1892.] The Author. [2 copies.]

FLORAL SOCIETIES.

World's Fair Chrysanthemum Show under the auspices of the Horticultural Society of Chicago and the National Chrysanthemum Society of America. To be held in the Horticultural Building, World's Fair Grounds, Chicago, Ill., Nov. 4 to Nov. 14, 1893. Schedule of Prizes. Pamphlet, 8.4×—×6., pp. 11. Robert Craig, Director.

American Chrysanthemum Society, Report of the Committee on Classification of Chrysanthemums before the, at Washington, D. C., August, 1892. Pamphlet, blue, 8.1×.1×5.7, pp. 37. [Boston: 1893?] E. A. Wood.

Yonkers Chrysanthemum Show . . . to be held Oct. 31st to Nov. 4th, inclusive, 1893. Schedule of Prizes for Chrysanthemums. 2d edition. Pamphlet, pink, 9.2×—×5.8, pp. (10.) Yonkers, N. Y.: 1893. John Beattie, Manager.

Chrysanthemum Society, The National [English.] Annual Report and Financial Statement. Schedule of Prizes for 1893. Pamphlet, pink, 8.4×.2×5.5, pp. 68. [London: 1893.] C. Harman Payne, Foreign Corresponding Secretary.

American Florists, Society of. Proceedings of the Third Annual Convention, held at Chicago, Ill., Aug. 16–18, 1887. Pamphlet, gray, 8.9×.3×5.9, pp. 154, (1); portrait. Boston: 1887. William J. Stewart, Secretary.

Proceedings of the Fifth Annual Convention, held at Buffalo, N. Y., Aug. 20–23, 1889. Pamphlet, lilac, black cloth back, 9.2×.3×5.9, pp. 127, xxvi, (1); portrait. Boston: 1889.

Proceedings of the Sixth Annual Convention, held at Boston, Mass., Aug. 19–22, 1890. Pamphlet, gray, black cloth back, 9.1×.3×5.8, pp. 102, xxxviii, (1); portrait. Boston: 1890.

Proceedings of the Seventh Annual Convention, held at Toronto, Ont., Aug. 18–21, 1891. Pamphlet, pale green, black cloth back, 9.1×.4×5.8, pp. 164, xxviii, (1); portrait. Boston: 1891.

Proceedings of the Eighth Annual Convention, held at Washington, D. C., August 16–19, 1892. Pamphlet, gray, black cloth back, 9.1×.3×5.7, pp. 167, xxxiii, (1); portrait, Boston: 1892.

Proceedings of the Ninth Annual Convention, held at St. Louis, Mo., Aug. 9th, 10th, 11th, and 12th, 1893. Pamphlet, fawn-color, black cloth back, 9.×.4×5.7, pp. 127, xxvi, (1); portrait, 5 cuts. Boston: 1893. William J. Stewart, Secretary.

Toronto Gardeners' and Florists' Association. Fourth Annual Chrysanthemum Show, November 21–24, 1893. Pamphlet, 8.8×—×5.8, pp. (6). (Toronto: 1893.) A. H. Ewing, Secretary.

FRUITS.

Ives, John M. New England Book of Fruit; containing an abridgment of Manning's Descriptive Catalogue of the most valuable varieties of the Pear, Apple, Peach, Plum, and Cherry, for New England culture. To which are added the Grape, Quince, Gooseberry, Currant, and Strawberry; with outlines of many of the finest sorts of Pears drawn from Nature; with directions for pruning, grafting, and general modes of culture. Third edition, revised and enlarged. Faded brown cloth, 6.4×.4×4.1, pp. viii, 144; colored frontispiece and title-page, cuts. Salem and Boston: 1847. S. F.

Lyon, T. T. Fruit Report. [Bulletin 88, Michigan Agricultural Experiment Station.] Pamphlet, 9.2×.1×6.1, pp. 31. 1892. The Author.

Forsyth, William, F. A. S. and F. S. A. A Treatise on the Culture and Management of Fruit Trees; etc., etc. To which are added an introduction and notes adapting the rules of the treatise to the Climates and Seasons of the United States of America. By William Cobbett. Half calf, 8.5×1.3×5.2, pp. xii, 259; 13 plates. Philadelphia: 1802. S. F.

Morgan, Sampson, *Editor*. The Fruit Growers' Year Book Illustrated. 1893. Straw-colored paper, 8.2×.3×5.2, pp. 94; cuts. London: [1893.] S. F.

Kraft, Johann. Pomona Austriaca. Abhandlung von den Obstbäumen, etc. 2 vols. Half red calf, 17.5×1.5×11., [I.] pp. xvi, 45; colored frontispiece and 100 colored plates. Wien: 1792. [II.] pp. 46; colored plates 101–200. Wien: 1796. S. F.

Noort, Mathieu van. Pomologia Batava, of Afbeelding en beschrijving van onderscheidene soorten van Appelen en Peeren, welke in de Nederlandsche gewesten worden gekweekt. Half dark blue calf, 11.1×1.8×9., 84 colored plates with descriptive text; 4 pp. preface. [Leyden: 1830.] S. F.

Berghuis, S. De Nederlandsche Boomgaard beschreven en uitgeven door het bestuur der Vereeniging tot regeling en verbetering van de Vruchtsoorten te Boskoop, met afbeeldingen naar de natuur door S. Berghuis. Van eene voorrede voorzien door Dr. H. C. van Hall. 2 vols. Brick red cloth, 12.5×1.6×9.8, pp. xxvi, (16), 120, and (21), 72, 32, 24, 8, 4; 2 colored frontispieces and colored plates 60, and 36, 8, 12, 4, 4. Groningen: 1868. S. F.

Christ, J. L. Von Pflanzung und Wartung der nüzlichsten Obstbäume und ihrer besonders in Kronberg gezogenen Arten und Sorten, etc. 2 vols. [Vol. 1 is second edition.] Boards, green, 7.1×1.×4.2. [I.] pp. xxiv, 486, (8); 2 plates. Frankfurt am Main: 1792. [II.] pp. xvi, 312. Frankfurt am Main: 1791. S.F.

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Good Roads.
Cottage Hearth.
Boston Daily Advertiser.
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Boston Post.
Boston Daily Globe.
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